

# Service Manual

## and Technical Guide

PERSONAL FACSIMILE

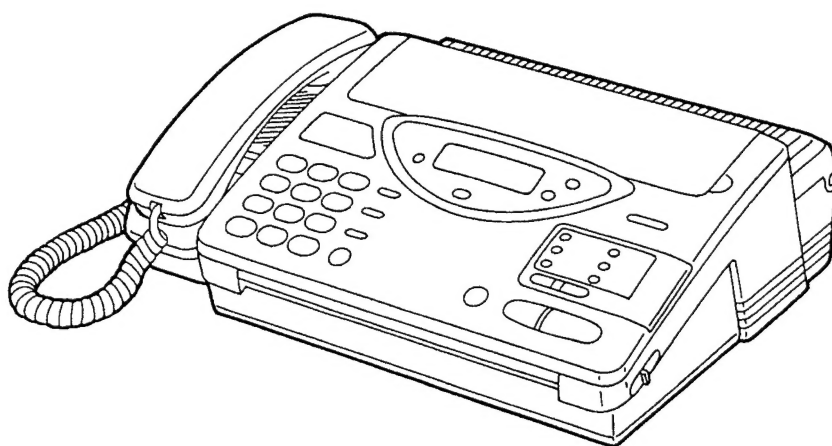
# KX-F2200E-G

Grey Version

# KX-F2200E-W

White Version

(for United Kingdom)



### WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

# Panasonic

©1995 Kyushu Matsushita Electric Co., Ltd.  
All rights reserved. Unauthorized copying and distribution is a violation of law.

When you mention the serial number, write down the 11 digits. The serial number may be found on the label affixed to the bottom of the unit.

## TABLE OF CONTENTS (General)

	Page
SAFETY PRECAUTIONS .....	3
INSULATION RESISTANCE TEST .....	3
FOR SERVICE TECHNICIANS .....	3
SPECIFICATIONS .....	4
CONNECTION .....	5
LOCATION OF CONTROLS .....	6
FEATURES .....	8
MAINTENANCE ITEM .....	9
TROUBLESHOOTING GUIDE .....	12
DISASSEMBLY INSTRUCTIONS .....	63
HOW TO REPLACE FLAT PACKAGE IC .....	74
ADJUSTMENTS .....	75
CIRCUIT OPERATIONS .....	81
CONNECTION DIAGRAM .....	140
PRINTED CIRCUIT BOARD .....	141
SCHEMATIC DIAGRAM .....	145
TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES .....	165
TOOLS .....	167
CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION .....	168
ACCESSORIES AND PACKING MATERIALS .....	174
REPLACEMENT PARTS LIST .....	175

### NOTE

#### SAFETY CAUTIONS FOR LITHIUM BATTERY

(FOR UNITED KINGDOM)

THE LITHIUM BATTERY IS A CRITICAL COMPONENT

TYPE NUMBER	CR2032	(BATT)	MANUFACTURED BY	MATSUSHITA
	CR2032	(BATT)		SONY

IT MUST NEVER BE SUBJECTED TO EXCESSIVE HEAT OR DISCHARGE. IT MUST THEREFORE ONLY BE FITTED IN EQUIPMENT DESIGNED SPECIFICALLY FOR ITS USE.

REPLACEMENT BATTERIES MUST BE OF AN APPROVED TYPE AND MANUFACTURER AS INDICATED ABOVE. THEY MUST BE FITTED IN THE SAME MANNER AND LOCATION AS THE ORIGINAL BATTERY, WITH THE CORRECT POLARITY CONNECTIONS OBSERVED.

DO NOT ATTEMPT TO RE-CHARGE THE OLD BATTERY OR RE-USE IT FOR ANY OTHER PURPOSE. IT SHOULD BE DISPOSED OF IN WASTE PRODUCTS DESTINED FOR BURIAL RATHER THAN INCINERATION.

#### WARNING

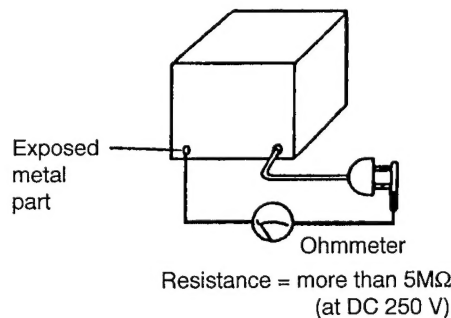
THE LITHIUM BATTERY IN THIS EQUIPMENT MUST ONLY BE REPLACED BY QUALIFIED PERSONNEL. WHEN NECESSARY, CONTACT YOUR LOCAL PANASONIC SUPPLIER.

## SAFETY PRECAUTIONS

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended components.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to perform the following insulation resistance test to prevent the customer from being exposed to shock hazards.

## INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part (screwheads, control shafts, handle brackets, etc.).  
 "Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard.  
 The equipment should be repaired and rechecked before it is returned to the customer.



## FOR SERVICE TECHNICIANS

**ICs and LSIs are vulnerable to static electricity.**

**When repairing, the following precautions will help prevent recurring malfunctions.**

- 1) Cover the plastic parts boxes with aluminum foil.
- 2) Ground the soldering irons.
- 3) Use a conductive mat on the worktable.
- 4) Do not touch IC or LSI pins with bare fingers.

## SPECIFICATIONS

### 1. Integrated Telephone System (ITS) Section

Type:	D type handset, Single ITS
	Push button type 12 key dial pad
Function:	Speaker Phone (Electric Volume type, 8-level)
	10 stations one-touch dialer (30 digits)
	Auto redial
	Electronic telephone directory
	Combination dialing
	22 speed dialer
	Ringer control [3-steps (H, L, Off) control type]
	Pulse dialing or DTMF (Tone) Dialing
	Mercury compatible

### 2. Telephone Answering Machine (TAM) Interface Section

Type:	External TAM or Telephone jack
Function:	Automatic EXT. TAM/FAX selection
	TEL, FAX, TEL/FAX, EXT. TAM selector

### 3. Facsimile Section

Type:	Desk top.
Applicable Lines:	Public switched telephone network
Compatibility:	ITU-T G3
Document Size:	MAX, 216 mm (8 1/2") in width, MAX. 600 mm (23 5/8") in length
Effective Scanning Width:	MAX, 208 mm (8 3/16")
Printing Paper Size:	210 mm (letter)×30 m roll (8 1/4"×98 ft roll), 210 mm (letter)×50 m roll (8 1/4"×164 ft roll)
Effective Printing Width:	208 mm (8 3/16")
Transmission Time*:	Approx. 30 sec/page (G3 Normal mode)
	Approx. 15 sec/page (Original mode)
Scanning Density:	Horizontal 8 pels/mm (203 pels/inch)
	Vertical 3.85 lines/mm (98 line/inch)-Standard
	7.7 lines/mm (98 line/inch)-Fine
	15.4 lines/mm (392 line/inch)-Superfine
Image Sensor Type:	CCD image sensor
Printer Type:	Thermal printer
Data Compression System:	Modified Huffman (MH), Modified Read (MR)
Modem Speed:	9600/7200/4800/2400 bps; Automatic fallback
Function:	10 station automatic transmission, Delayed Transmission
	Automatic document feeder (Max. 15 page), Polling, Polled
	Copy function, Silentfax Receiving,
	Remote Fax Receiving, Paper Cutter, Junk Mail Prohibitor
	Paper curl reduction, HELP function

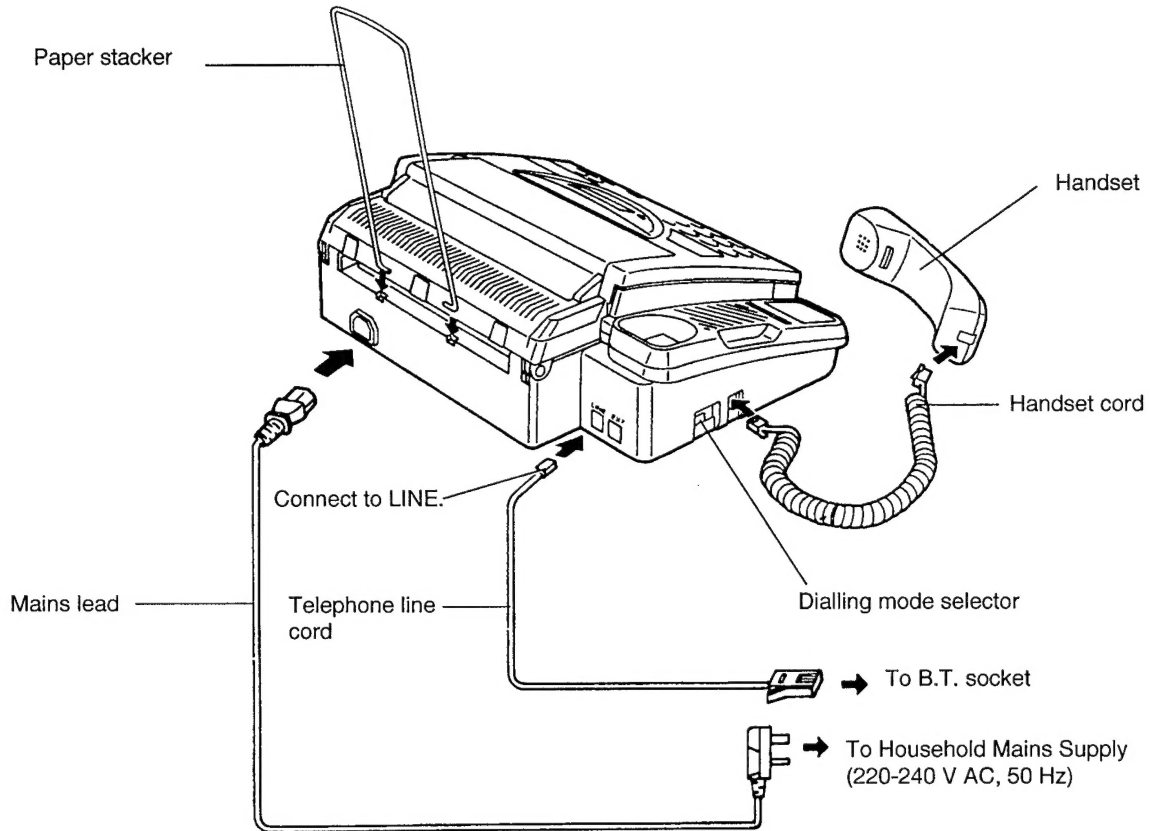
### 4. General

Power Supply:	AC 220-240V, 50Hz
Power Consumption:	1 Battery 3 V (Lithium Battery)···For Memory Backup and Real Time Clock Backup
	Transmission: Approx. 15 W
	Reception: Approx. 35 W
	Copy: Approx. 40 W
	Standby: Approx. 5 W
	Maximum: Approx. 100 W
LCD:	15×1 line
Speaker:	5 cm (1 31/32") PM dynamic
Microphone:	Condensor microphone (for SP-Phone)
Dimensions (H×W×D)	122×362×287 mm (4 13/16"×14 1/4"×11 5/16")
Weight:	3.9 kg (8.6 lb.)

\*Transmission Time: Transmission time applies to text data using ITU-T No. 1 test chart, between same machine models at maximum modem speed.  
Transmission time varies in actual usage.

Design and specifications are subject to change without notice.

## CONNECTION

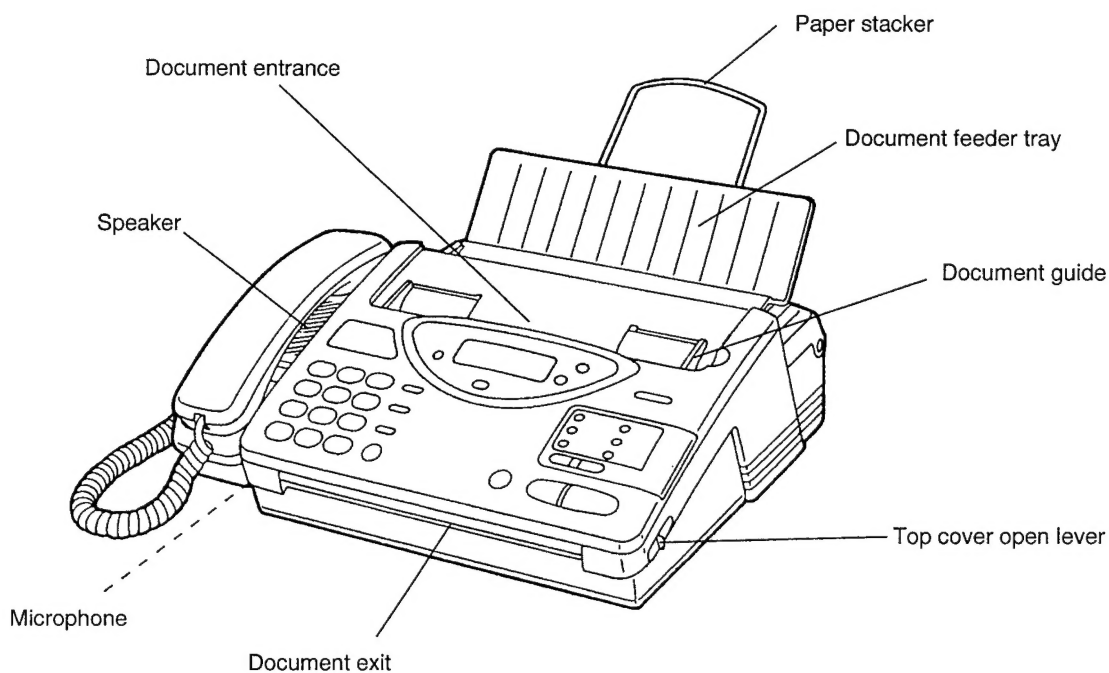


**Note:**

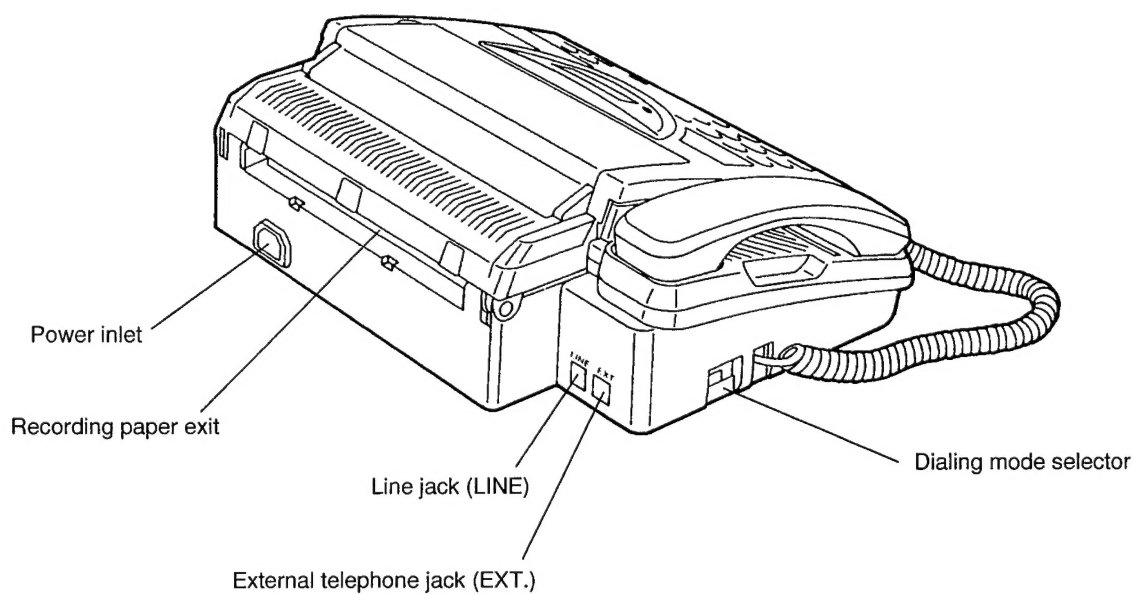
- When a mains power failure takes place, you are only able to use the unit as a standard telephone.
- When you operate this product, the socket outlet should be near the product and be easily accessible.
- Telephone line connections and handset connection are at TNV (Telecommunication Network Voltage).
- You can connect an external telephone/answering machine to the unit after peeling off the tape on the external telephone jack (EXT).  
In this case, the extension telephone adaptor (option) is required.

## LOCATION OF CONTROLS

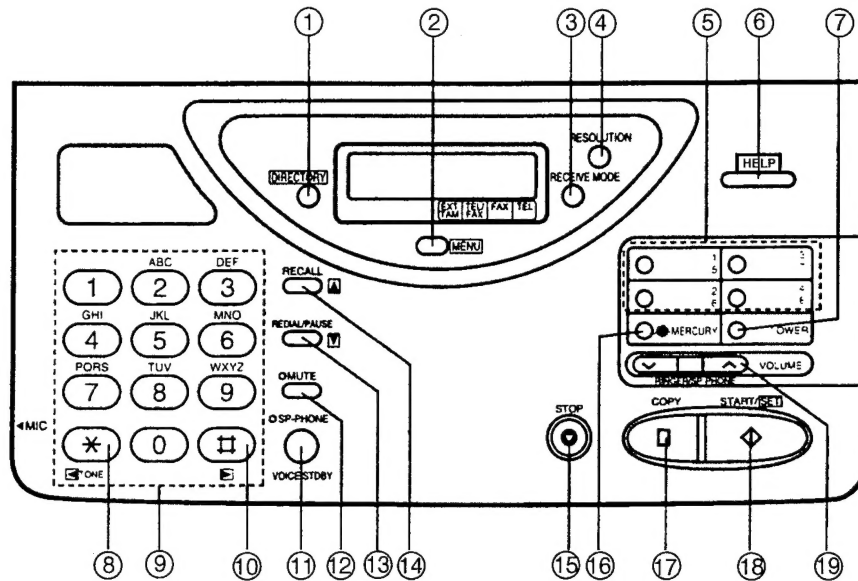
### Front view



### Rear view



## Control panel



- ① **DIRECTORY button**  
Used for speed dialling. Also used for the electronic telephone directory.
- ② **MENU button**  
Used to start and exit various programming.
- ③ **RECEIVE MODE button**  
Used to select the desired receiving mode.
- ④ **RESOLUTION button**  
Used to adjust the definition.
- ⑤ **Direct call station keys**  
Used for one-touch dialling. Also used as character keys when logo and station names are programmed.
- ⑥ **HELP button**  
Used to print an easy guide of operations.
- ⑦ **LOWER key**  
Used to access lower stations (5 to 8) for one-touch dialling.
- ⑧ **TONE/ <- button**  
Used to temporarily change the dialling mode from pulse to tone during a dialling operation.  
Also used to move the cursor to the left while programming.
- ⑨ **Dial keypad**  
Used for dialling operation and parameter setting. Also used as character keys.
- ⑩ **Hash/ <- button**  
Used to enter a space in your telephone number while programming.  
Also used to move the cursor to the right while programming.
- ⑪ **SP-PHONE/VOICE STDBY button**  
Used for on-hook dialling and voice contact features.
- ⑫ **MUTE button**  
Used for voice muting.
- ⑬ **REDIAL/PAUSE button**  
Used to redial the last dialled number. Also used to insert a pause into a phone number.
- ⑭ **RECALL button**  
Used to access some features of your host exchange.
- ⑮ **STOP button**  
Used to stop fax communication.
- ⑯ **MERCURY button**  
Used to store the Mercury access number and authorisation (PIN) code, and make calls using the Mercury network.
- ⑰ **COPY key**  
Used to start copying.
- ⑱ **START/SET button**  
Used to start fax communication. Also used to store parameters during programming.
- ⑲ **VOLUME button**  
Used to adjust the volume level of the ringer and speaker.

## **FEATURES**

### **General**

- Desktop type
- LCD (Liquid Crystal Display) readout
- Automatic paper cutter
- Silent ring fax recognition system
- Help function
- TAM (telephone answering machine) interface
- Copier function

### **Facsimile**

- Automatic document feeder (up to 15 sheets)
- 64-level halftones
- Resolution: standard/fine/super fine/halftone
- Delayed transmission
- Paper save function
- Overseas transmission mode
- Remote fax receiving using an extension phone
- Junk mail prohibitor

### **Integrated telephone system**

- One-touch dialer (10 phone numbers)
- 22-station speed dialer
- Hands-free speakerphone
- Electronic telephone directory

## MAINTENANCE ITEM

### 1. OUTLINE

MAINTENANCE AND REPAIRS ARE PERFORMED USING THE FOLLOWING STEPS.

#### 1) Periodic maintenance

Inspect the equipment periodically and if necessary, clean any contaminated parts.

#### 2) Check for breakdowns

Look for signs of trouble and consider how the problems arose.

If the equipment can still be used, perform a copying, self testing or communications testing.

#### 3) Check equipment

Perform a copying, self testing and communications testing to determine if the problem originates from the transmitter, the receiver or the telephone line.

#### 4) Determine causes

Determine the causes of equipment trouble by troubleshooting.

#### 5) Equipment repairs

Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem does not recur.

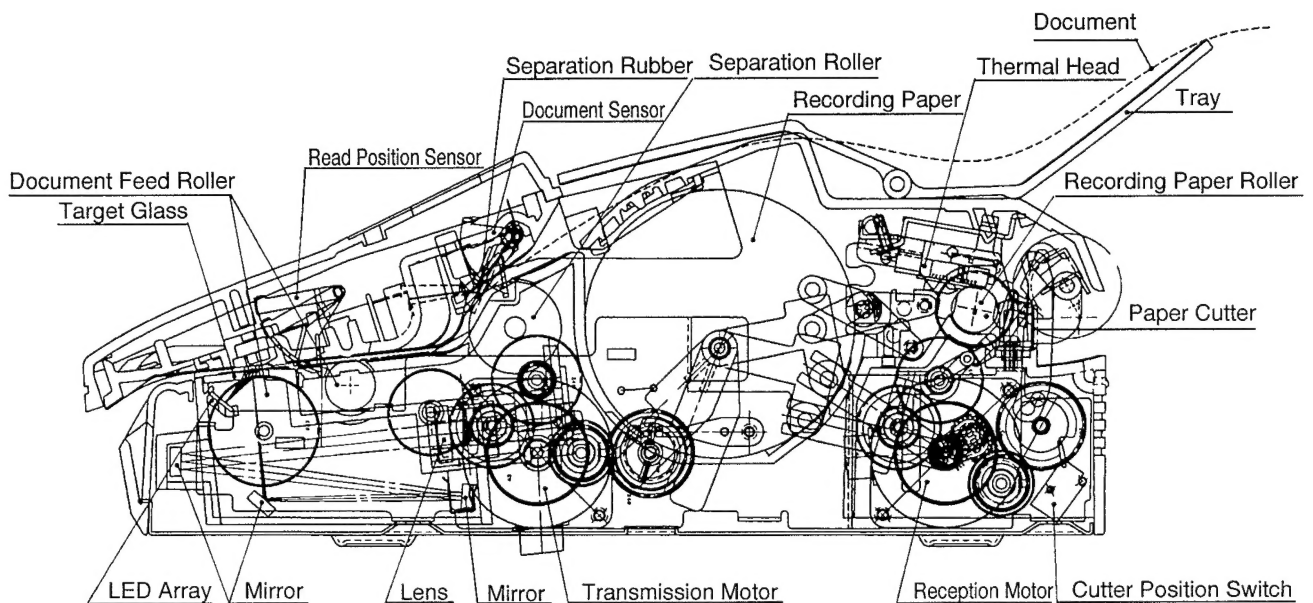
#### 6) Confirm normal operation of the equipment

After completing the repairs, conduct copying, self testing and communications testing to confirm that the equipment operates normally.

#### 7) Record keeping

Make a record of the measures taken to rectify the problem for future reference.

### 2. MAINTENANCE CHECK ITEMS



## 2-1. MAINTENANCE LIST

NO.	OPERATION	CHECK ITEM	REMARKS
1	Document Path	Remove any foreign matter such as paper.	_____
2	Rollers	If the roller is dirty, clean it with a damp cloth then dry thoroughly.	See page 11.
3	Thermal Platen	If the platen is dirty, clean it with a damp cloth then dry thoroughly. Remove the paper before cleaning.	See page 69.
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.	See pages 11,65.
5	LED Array	If the LED array is dirty, clean the glass with a dry soft cloth.	See page 11.
6	Sensors	Recording paper sensor (PS1), Document sensor (PI302), Read position sensor (PI301), Cover open sensor (PS3). JAM sensor (PS2) Confirm operation of sensors.	See pages 45~47.
7	Mirrors and Lens	If the mirror and lens are dirty, clean it with a dry soft cloth.	_____
8	Abnormal, wear and tear or looseness of parts	Exchange the part. Check the tightness of screws on all parts.	_____

## 2-2. MAINTENANCE CYCLE

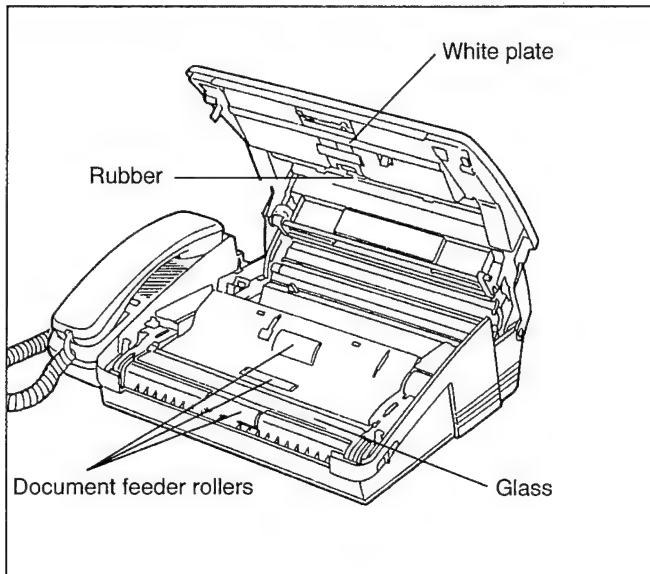
No.	Items	Cleaning		Replacement		Remarks
		Cycle	Procedure	Cycle	Procedure	
1	Separation Roller (Ref. No. 129)	3 months	See P. 11.	7 years (100,000 documents)	See P. 71.	
2	Separation Rubber (Ref. No. 67)	3 months	See P. 11.	7 years (100,000 documents)	-----	
3	Feed Roller (Ref. No. 130,131)	3 months	See P. 11.	7 years (100,000 documents)	See P. 71.	
4	Target Glass (Ref. No. 187)	3 months	See P. 11.	7 years (100,000 documents)	See P. 65.	
5	Thermal Head (Ref. No. 46)	3 months	See P. 11.	7 years (100,000 documents)	-----	
6	Recording Paper Roller (Ref. No. 105)	3 months	See P. 69.	7 years (100,000 documents)	See P. 69.	
7	Paper Cutter (Ref. No. 110)	-----		7 years (100,000 documents)	See P. 69.	

↑  
These values are only standard ones and may vary depending on usage conditions.

### 3. MAINTENANCE

#### Cleaning the document feeder unit

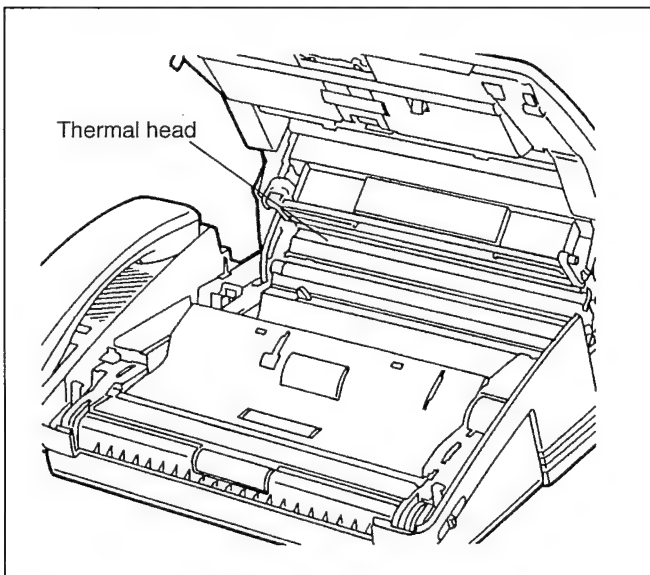
When the misfeeding occurs frequently or when dirty patterns or black bands appear on a copied or transmitted document, clean the document feeder rollers and the glass by following the steps below.



- (1) Disconnect the power cord and the telephone line cord.
- (2) Slide the lever to open the top cover.
- (3) Clean the rubber and document feeder rollers with a cloth moistened with isopropyl rubbing alcohol, then dry thoroughly.
- (4) Clean the glass and the white plate with a dry soft cloth.
- (5) Close the top cover carefully by pushing down on both ends gently.
- (6) Connect the power cord and telephone line cord.

#### Cleaning the thermal head

If dirty patterns or black bands appear on a copied or received document, clean the thermal head by following the steps below.



- (1) Disconnect the power cord and the telephone line cord.
- (2) Slide the lever forward to open the top cover.
- (3) Remove the recording paper roll from the unit.
- (4) Clean the thermal head with a cloth moistened with isopropyl rubbing alcohol, then dry thoroughly.
- (5) Re-install the recording paper roll, then close the top cover carefully by pushing down on both ends gently.
- (6) Connect the power cord and telephone line cord.

**Note:**

•To prevent malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly with your finger directly.

### 3. COMMUNICATION ERROR FUNCTIONS

#### 3-1. OPERATION

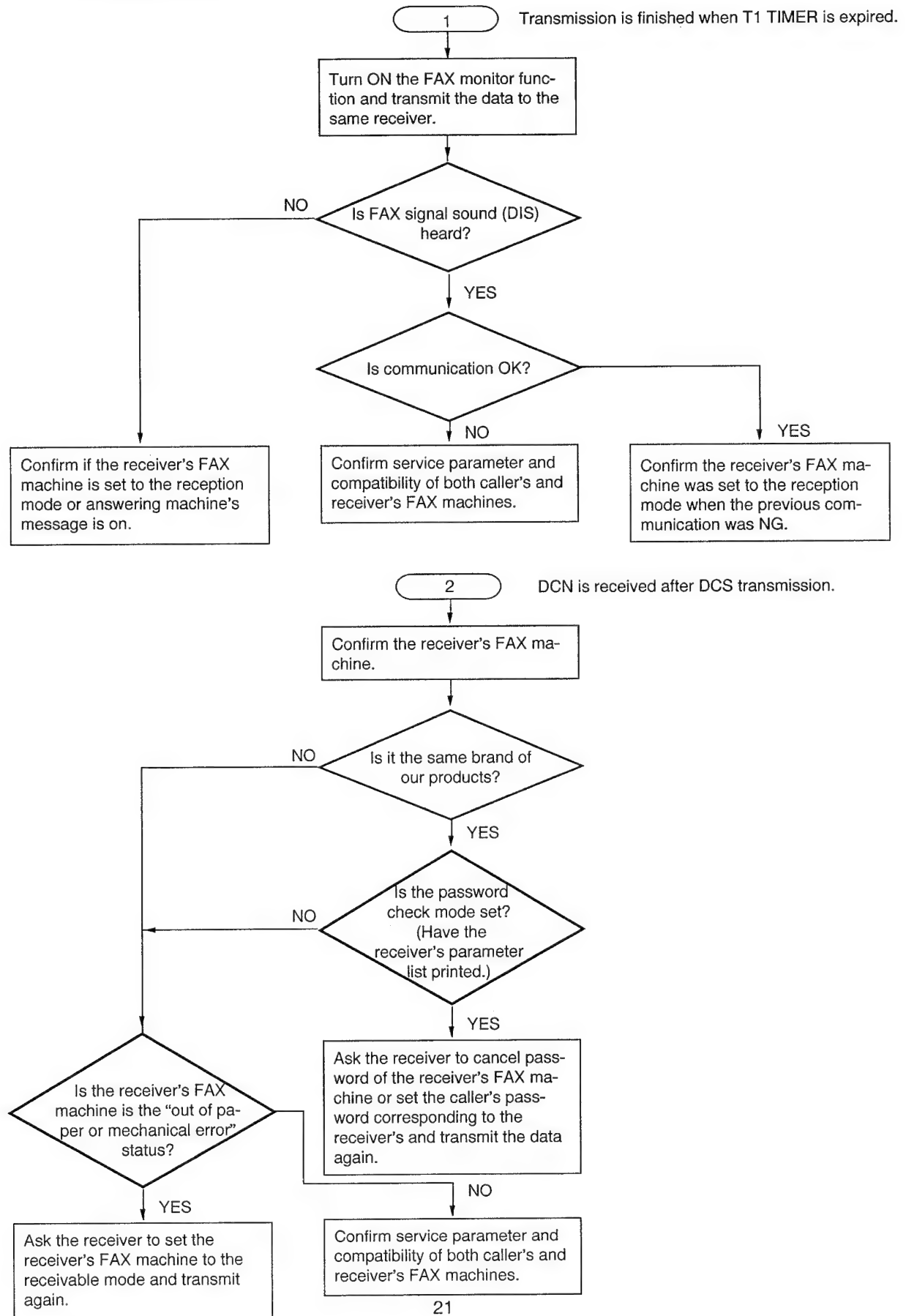
1. Press the MENU button 3 times.
2. press the START/SET button and ▼ (REDIAL/PAUSE) button 4 times.
3. Press the START/SET button.
4. Print out.

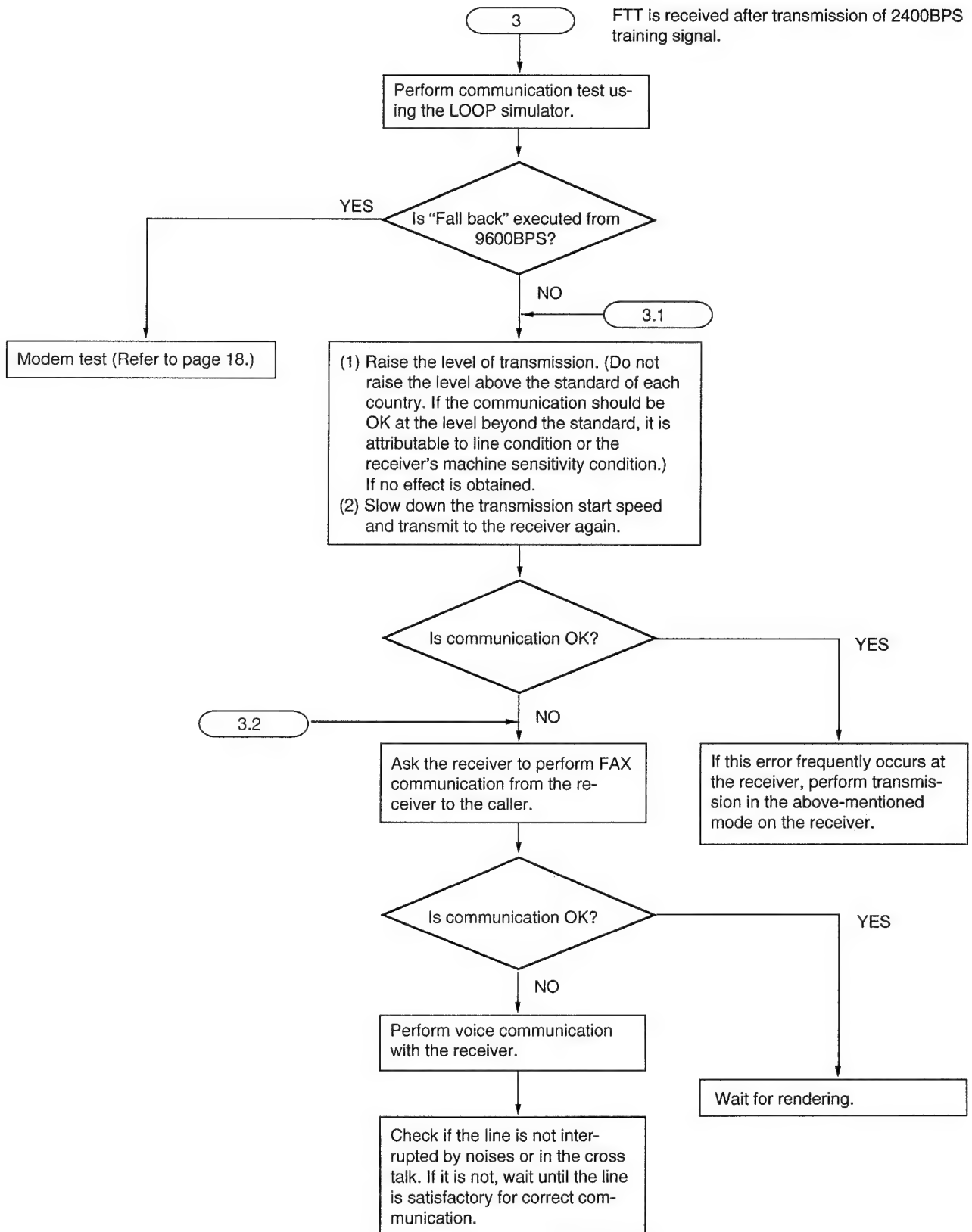
#### 3-2. ERROR CORD TABLE

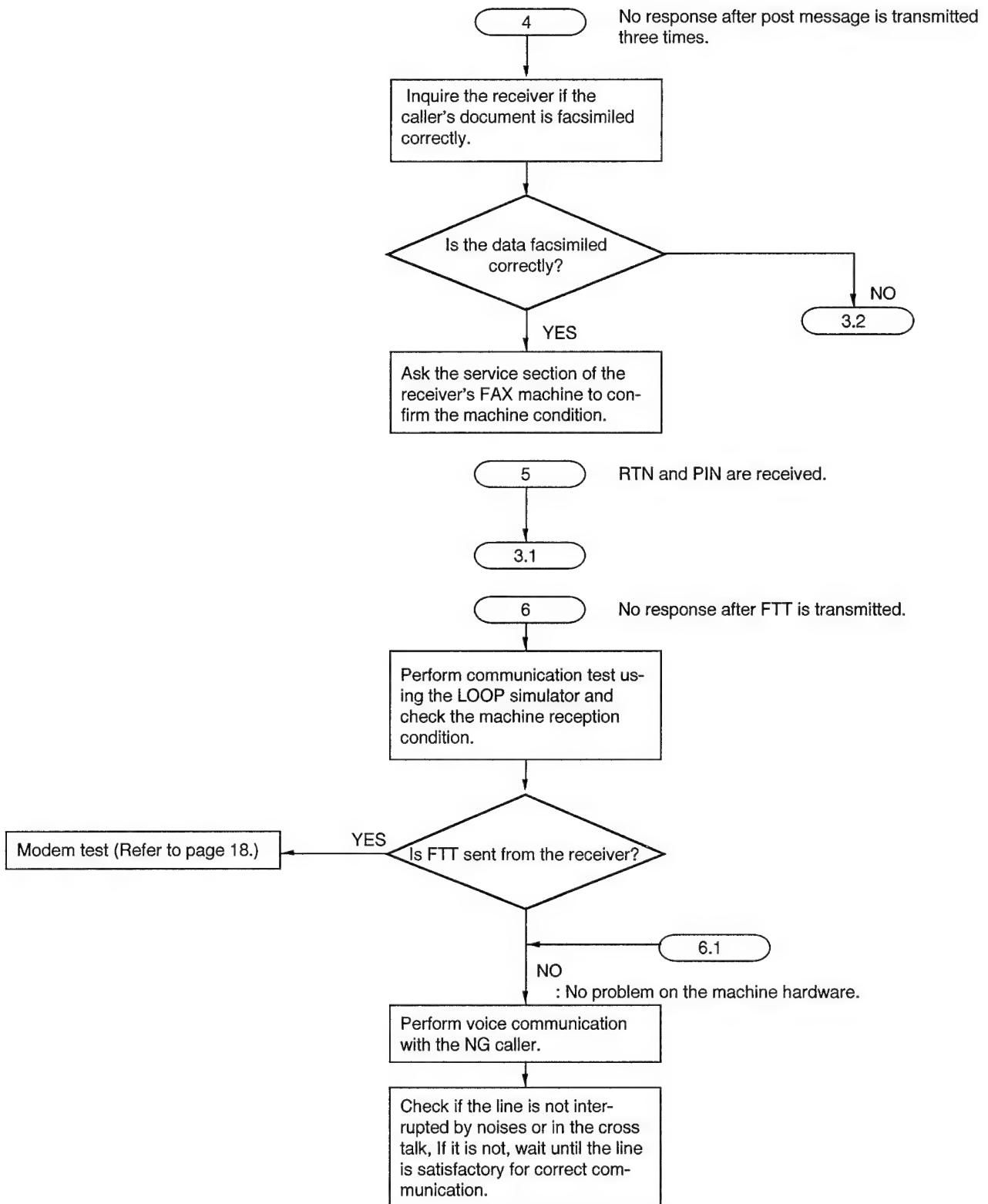
CODE	RESULT	MODE	SYMPTOM	Counter-measure
	PRESSED THE STOP KEY	TX & RX	Communication was interrupted with the STOP button	
	DOCUMENT JAMMED	TX	Document paper is jammed	
	NO DOCUMENT	TX	No document paper	
	PRINTER OVERHEATED	RX	Thermal head is overheated	
	PAPER OUT	RX	Out of thermal paper	
	THE COVER WAS OPENED	TX & RX	Cover is open	
	PAPER JAMMED	RX	Recording paper is jammed	
40	NO RESPONSE	TX	Transmission is finished when T1 TIMER is expired	1
41	COMMUNICATION ERROR	TX	DCN is received after DCS transmission	2
42	COMMUNICATION ERROR	TX	FTT is received after transmission of 2400BSP training signal	3
43	COMMUNICATION ERROR	TX	No response after post message is transmitted three times	4
44	COMMUNICATION ERROR	TX	RTN and PIN are received	5
46	COMMUNICATION ERROR	RX	No response after FTT is transmitted	6
48	COMMUNICATION ERROR	RX	No post message	7
49	COMMUNICATION ERROR	RX	RTN is transmitted	8
50	COMMUNICATION ERROR	RX	PIN is transmitted (to PRI-Q)	8
51	COMMUNICATION ERROR	RX	PIN is transmitted	8
52	NO RESPONSE	RX	Reception is finished when T1 TIME is expired	9
53	COMMUNICATION ERROR	TX	DCN is received after transmission of NSC and DTC	10
54	COMMUNICATION ERROR	RX	DCN is received after DIS transmission	11
57	COMMUNICATION ERROR	TX	300BPS error	12
58	COMMUNICATION ERROR	RX	DCN is received after FTT transmission	13
59	COMMUNICATION ERROR	TX	DCN responds to post message	14
64	COMMUNICATION ERROR	TX	Polling is not possible	15
68	COMMUNICATION ERROR	RX	No response at the other party after MCF or CFR is transmitted	13
70	COMMUNICATION ERROR	RX	DCN is received after CFR transmission	13
72	COMMUNICATION ERROR	RX	Carrier is cut when image signal is received	16
FF	COMMUNICATION ERROR	TX & RX	Modem error	12

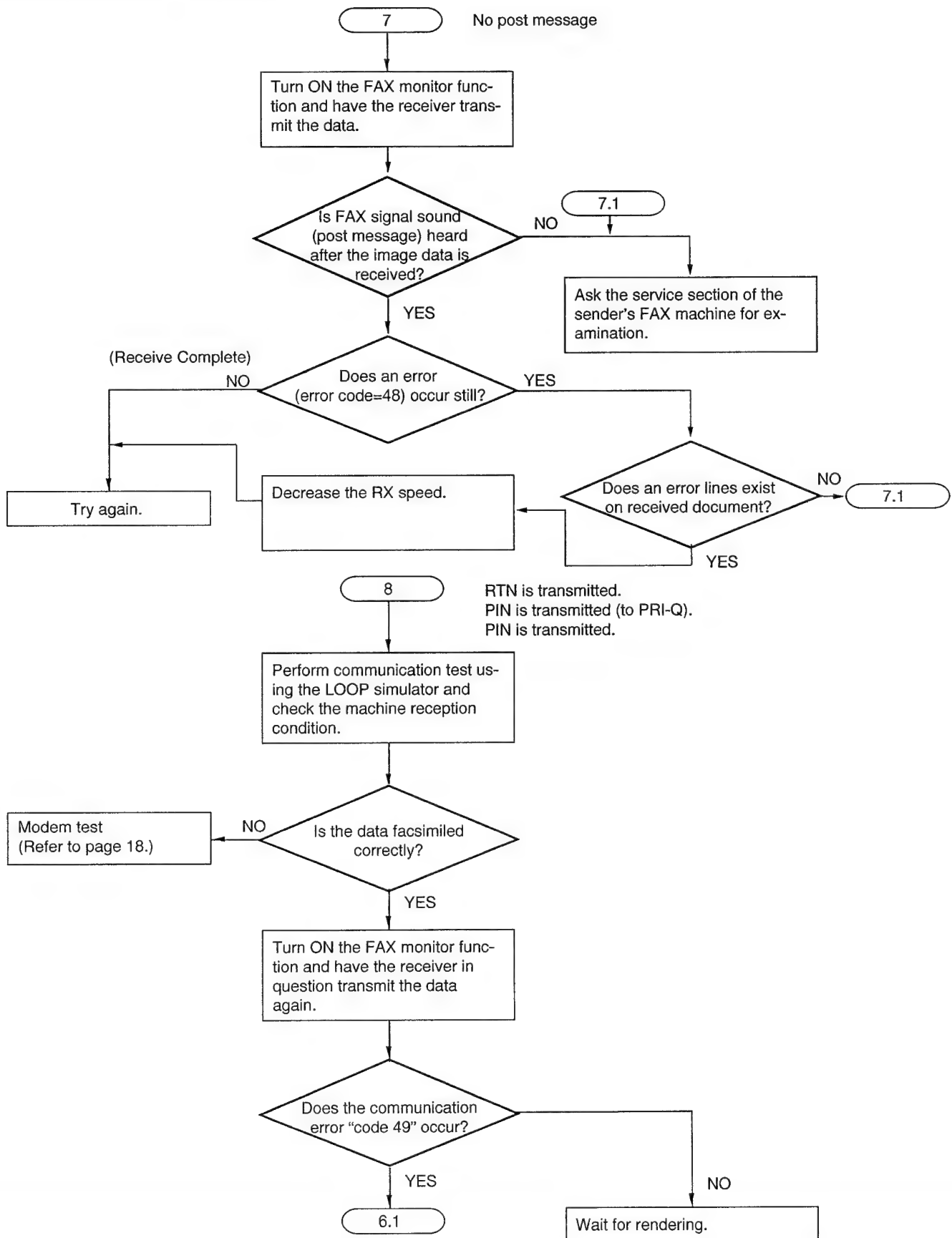
TX=TRANSMISSION RX=RECEPTION

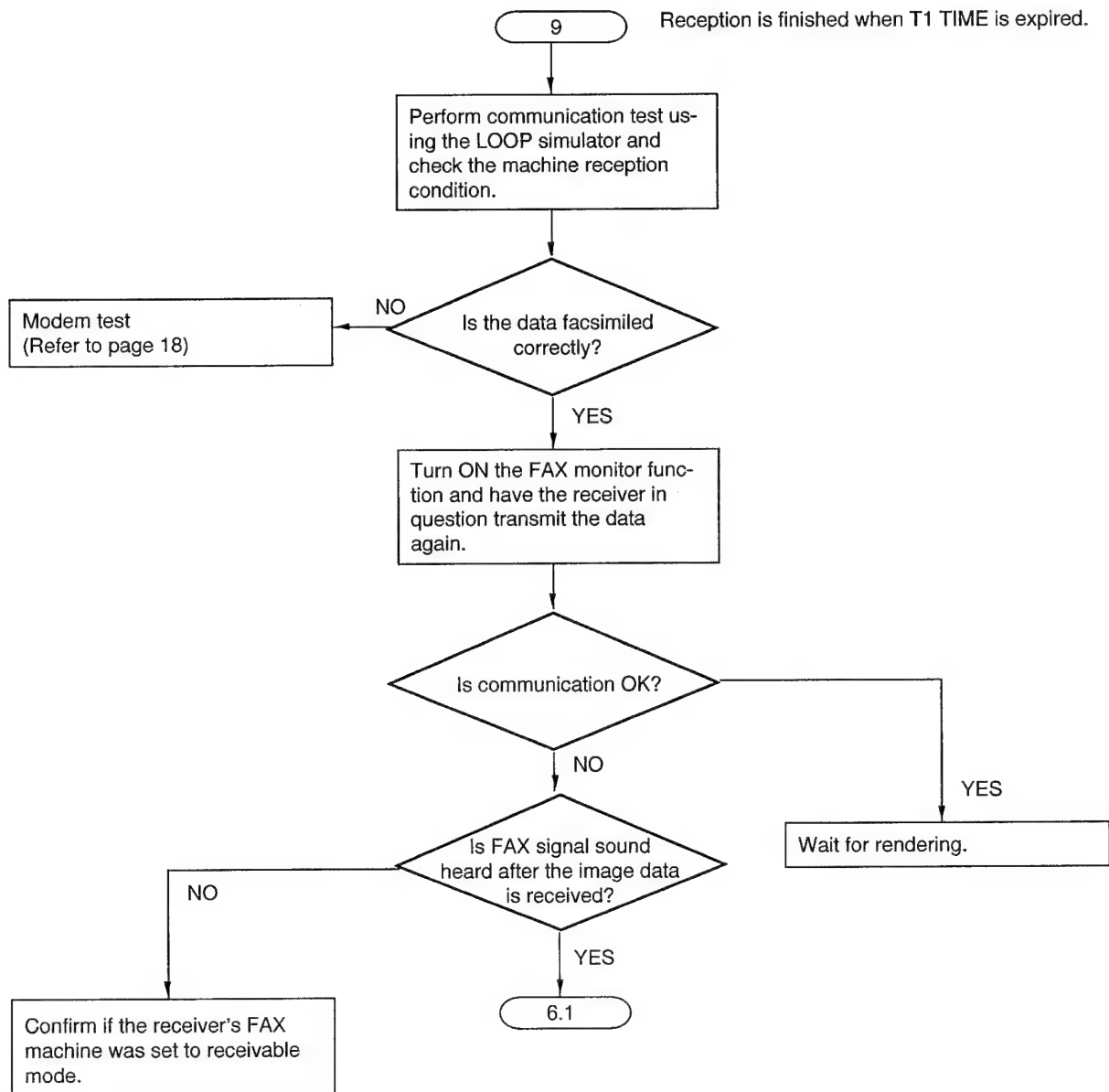
## 3-3. COUNTERMEASURE

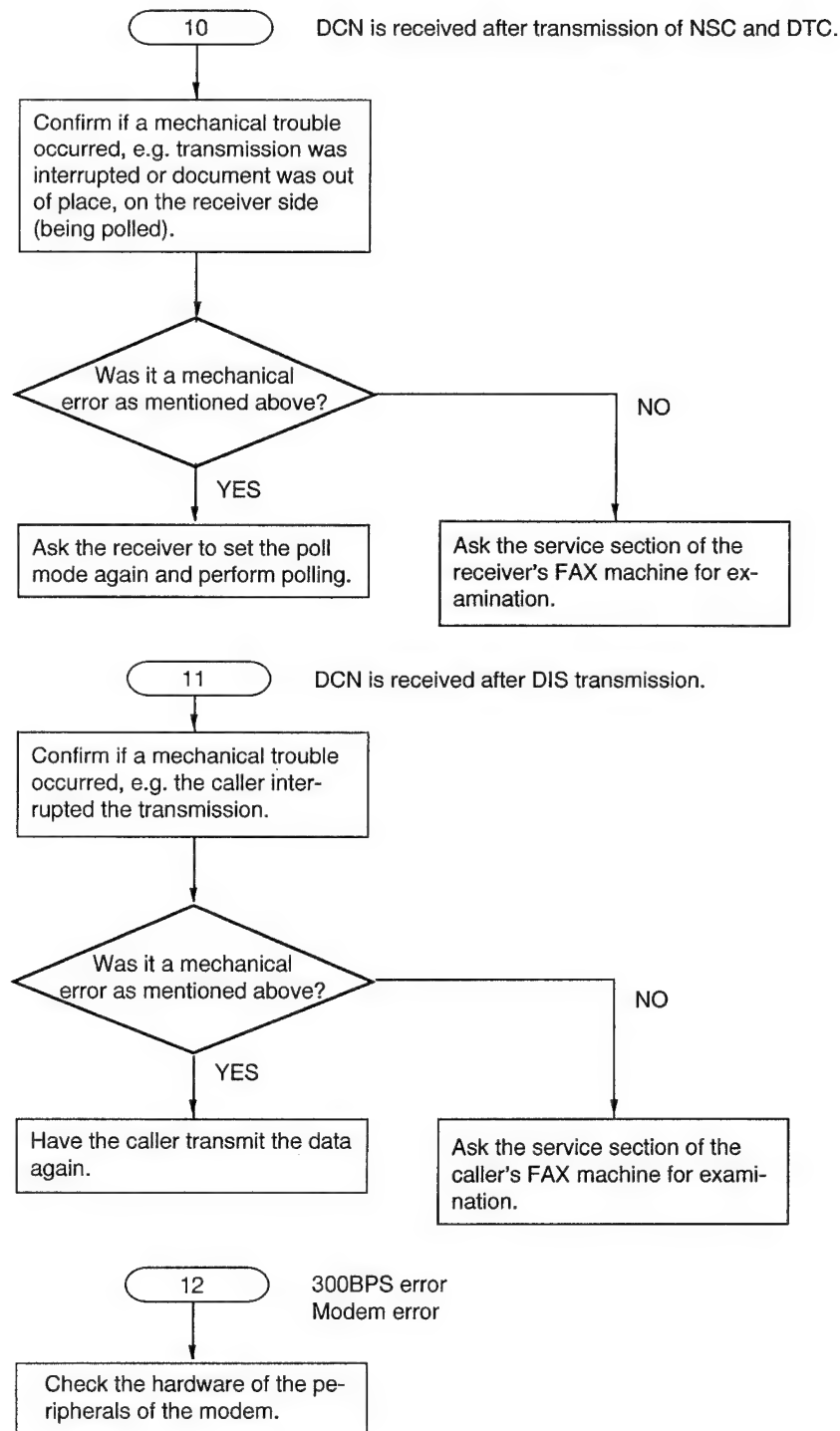


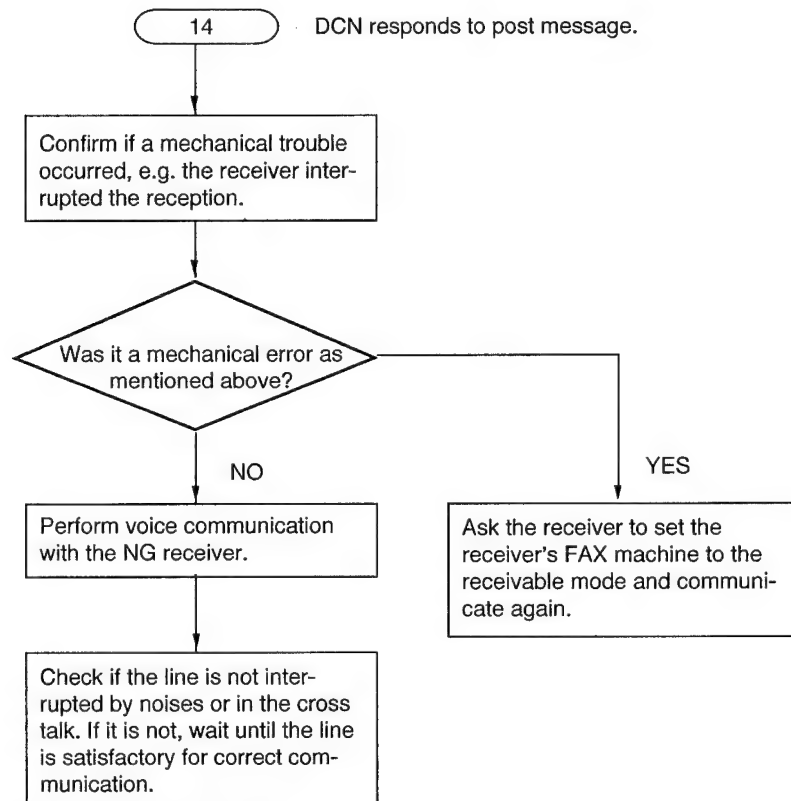
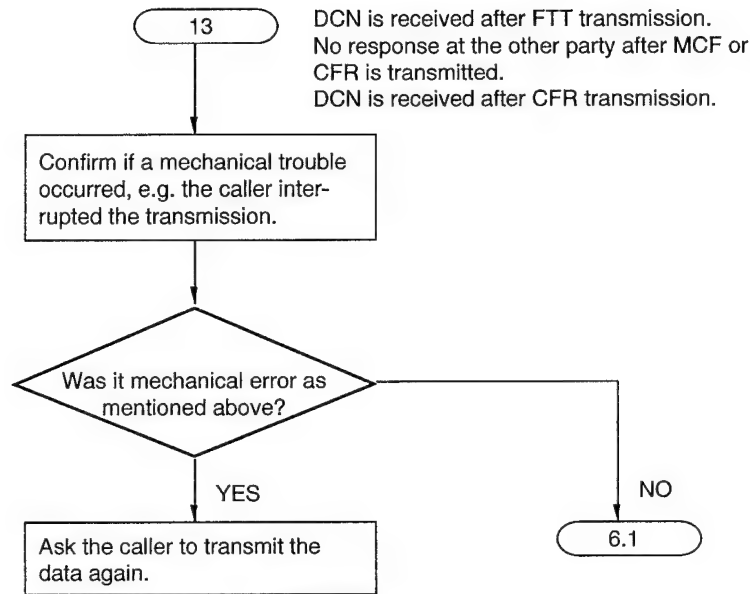


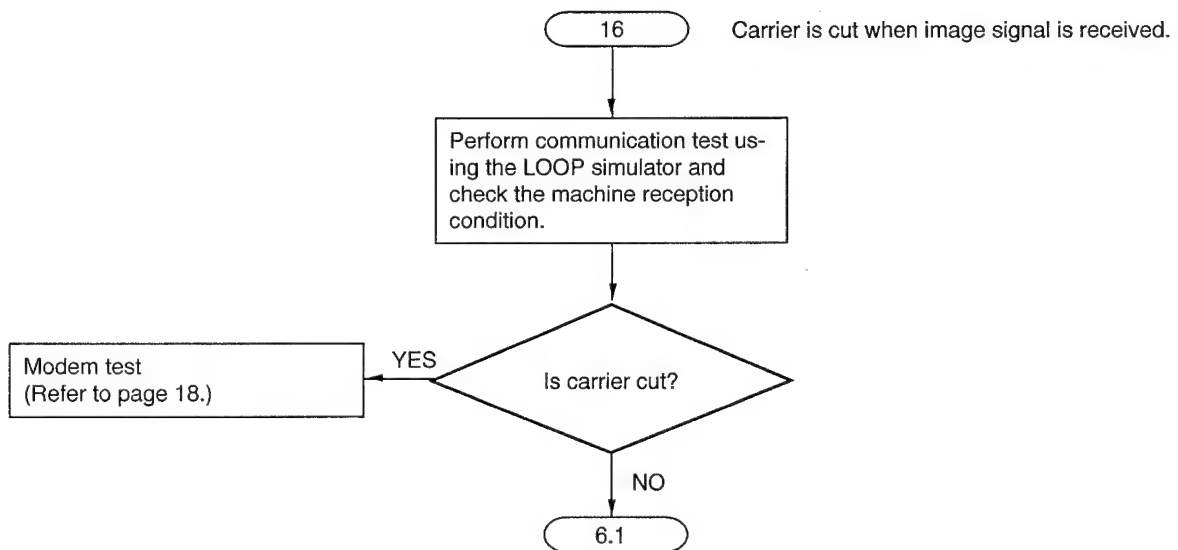
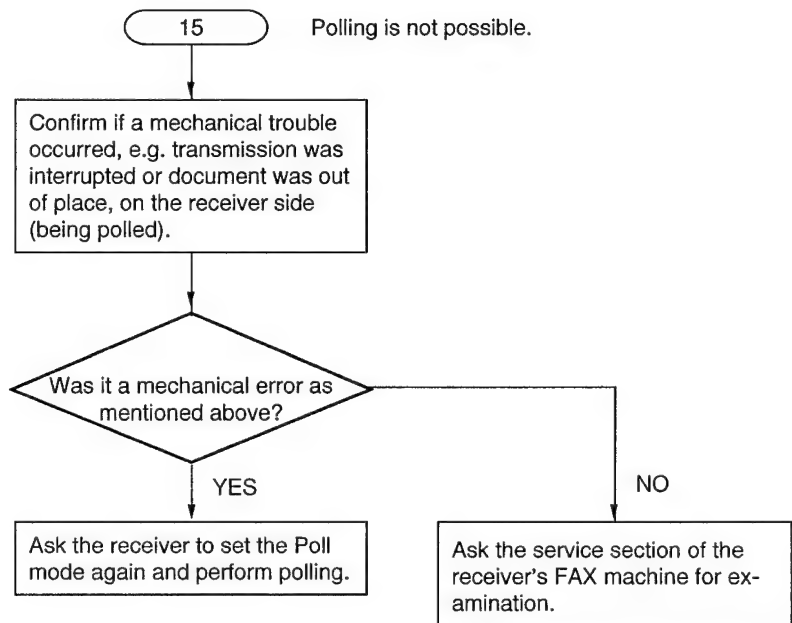












## 4. REMOTE PROGRAMMING

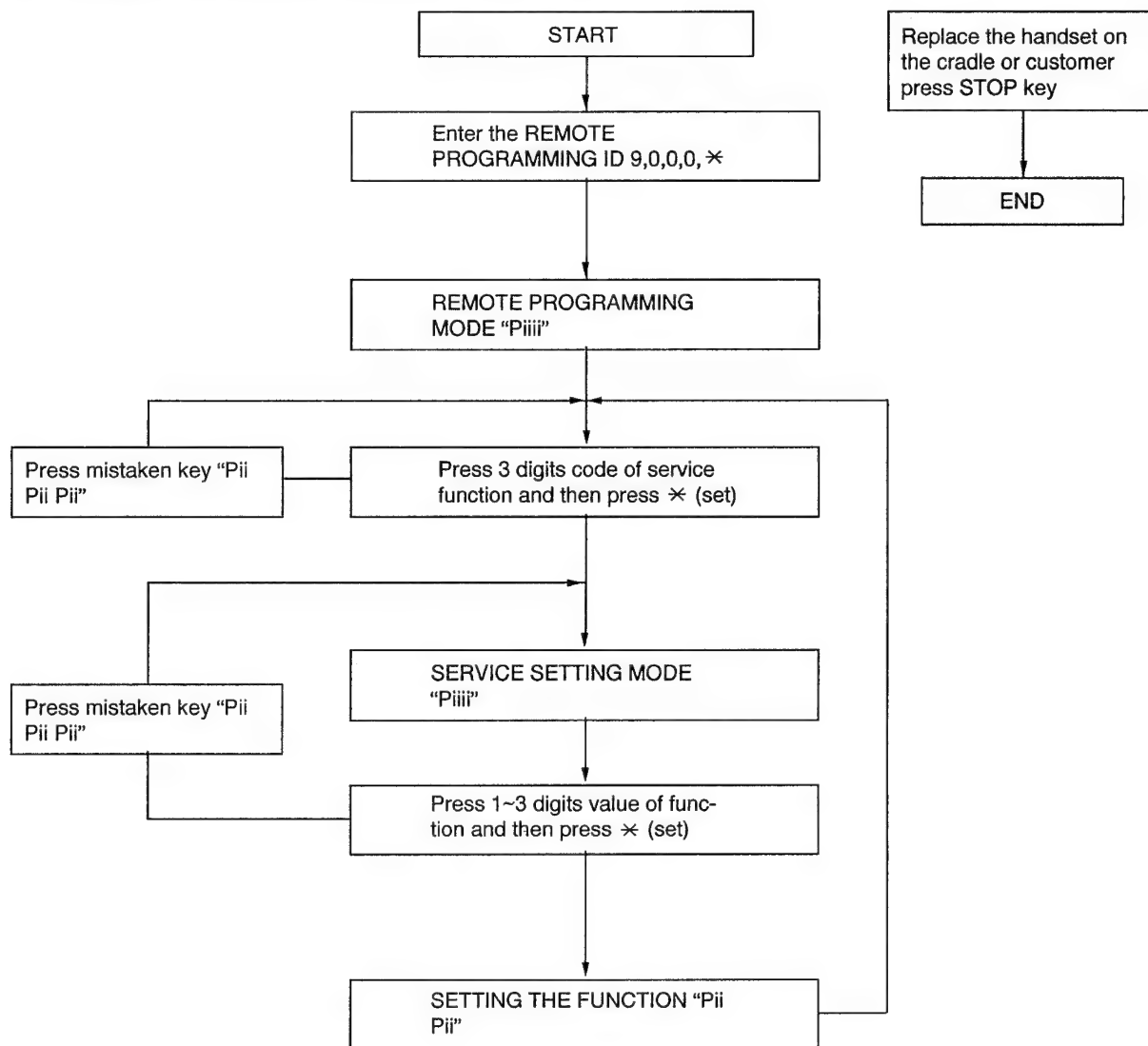
While a user is talking on the phone, a technician can set the functions of customer's unit from service center.

1. A call comes in service center.
2. A technician gets a claim from a customer.
3. He says to the customer "please press MENU button and wait for a moment".
4. The technician dial '9,0,0,0,\*' from his telephone.  
The customer's unit is set REMOTE PROGRAMMING MODE and generates remote beep sound.  
He hears "Piiii" (one long beep).
5. He presses 3 digits code of service function written in service manual by dial keypad.  
And presses \* (set).  
The customer's unit receives the service code.  
He hears "Piiii" (one long beep).
6. He presses 1~3 digits value of function written in service manual by dial keypad.  
And presses \* (set).  
The customer's unit receives the service value.  
He hears "Pii Pii" (double short beeps).
7. Then he can repeat from step 5.
8. When he wishes to end the REMOTE PROGRAMMING MODE, he replaces the handset on the cradle or the customer presses the STOP button.

### NOTE:

- 1) To enter the REMOTE PROGRAMMING MODE is necessary in Step 3. Because the unit can not easily enter the REMOTE PROGRAMMING by DTMF signal from the other party.
- 2) If he presses wrong buttons when his operation is in step 5 or 6. he hears "Pii Pii Pii" (triple short beeps). Then he can repeat from the same step.
- 3) When customer's unit finishes transmitting a list (No. 911,922,994,999), he can have a voice conversation.  
And he can continue the REMOTE PROGRAMMING MODE, but this feature is effective from version L.
- 4) When customer's unit start transmitting a list (No. 991,992,994,999), he does not hear "Pii Pii" (double short beeps).  
The unit generate CNG sound.

#### 4-1. SUMMARY OF REMOTE PROGRAMMING MODE



## 4-2. PROGRAM MODE TABLE

Code	Function	Set Value	Default	Remote setting
01	Set date and time	-----	95/1/1	NG
02	Your logo	up to 30 digits	PANASO	NG
03	Your telephone number	up to 20 digits	(NONE)	NG
04	Print transmission report	ERROR/ON/OFF	ERROR	OK
06	TEL/FAX delayed ring	1 to 4 rings	2	OK
07	FAX ring count	1 to 4 rings	2	OK
11	Remote TAM activation	ON/OFF ID = up to 5 digits (11)	OFF/11	NG
21	Logo position	OUT/IN/OFF	OUT	OK
22	Journal auto print	ON/OFF	ON	OK
23	Overseas mode	ON/OFF	OFF	NG
24	Junk mail prohibitor	ON/OFF ID = 2 digits (22)	OFF/22	NG
25	Delayed transmission	ON/OFF	OFF	NG
30	Silent FAX recognition ring	3 to 6 rings	3	OK
33	Paper save function	ON/OFF	OFF	NG
34	Extension copy	"COPY" push	-----	NG
35	Recall mode	T_BR/E_RE	T_BR	OK
40	Silent detection	ON/OFF	ON	OK
41	Remote FAX activation code	up to 4 digits	**	NG
46	Original	NORMAL/LIGHT/DARKER	NORMAL	NG
70	Reset mercury dial memory	YES/NO	NO	NG
80	Set default	YES/NO	NO	NG
501	Pause time set	001~600×100msec	035	OK
502	Flash time set	01~99×10msec	08	OK
503	Dial speed set	1:10/2:20pps	10	OK
520	CED frequency select	1:2100/2:1100Hz	2100	OK
521	International mode select	1:ON/2:OFF	ON	OK
522	Auto standby select	1:ON/2:OFF	ON	OK
523	Receive equalizer select	1:ON/2:OFF	ON	OK
550	Memory clear	"START" push	-----	NG
551	ROM check	"START" push	-----	NG
552	DTMF signal tone transmit select	1:ON/2:OFF	OFF	NG
553	Monitor on FAX communication select	1:OFF/2:P-B/3:ALL	OFF	NG
554	Modem test	"START" push	-----	NG
555	Scanner test	"START" push	-----	NG
556	Motor test	"START" push	-----	NG
557	LED test	"START" push	-----	NG
558	LCD test	"START" push	-----	NG
559	Paper jam detection select	1:ON/2:OFF	ON	OK
560	Cutter select	1:ON/2:OFF	OFF	NG
561	Key test	"START" push	-----	NG
562	Cutter test	"START" push	-----	NG
563	CCD position adjustment value set	00~30	-----	OK
565	LCD contrast	1:NORMAL/2:LIGHT/3:DARK	NORMAL	OK
570	Break % select	1:61/2:67%	67%	NG
571	ITS auto redial time set	00~99	03	OK
572	ITS auto redial line disconnection time set	001~999	065	OK
573	Remote turn-on ring number set	01~99	20	OK
574	Dial tone detection set	1:ON/2:OFF	OFF	OK
579	Detect bell type	1:TYPE I/2:TYPE II	TYPE I	OK
586	White line skip 2 select	1:ON/2:OFF	ON	OK
587	White line skip 2 select	1:ON/2:OFF	ON	OK
589	TCF check mode	1:NORMAL/SEVERE	NORMAL	OK
590	FAX auto redial time set	00~99	03	OK
591	FAX auto redial line disconnection time set	001~999	065	OK
592	CNG transmit select	1:OFF/2:ALL/3:AUTO	All	OK
593	Time between CED and 300 bps	1:75/2:500/3:1s	75ms	OK
594	Overseas DIS detection select	1:1st/2:2nd	1st	OK
595	Receive error limit value set	001~999	100	OK
596	Transmit level set	-15~00dBm	10	OK
597	Transmit speed 2400bps fixed mode select	1:ON/2:OFF	OFF	OK

**KX-F2200E-G/KX-F2200E-W**

Code	Function	Set Value	Default	Remote setting
700	Ext. TAM OGM time	01~99sec	10	OK
701	Silent detect time	01~99×100msec	40	OK
702	Ext. TAM ring count	0~9	5	OK
717	Transmit speed select	1:9600/2:7200/3:4800/4:2400bps	9600bps	OK
718	Receive speed select	1:9600/2:7200/3:4800/4:2400bps	9600bps	OK
719	Ringer off in TEL/FAX mode	1:ON/2:OFF	ON	OK
720	Manual tone detect	1:ON/2:OFF	OFF	OK
721	Pause tone detect	1:ON/2:OFF	ON	OK
722	Redial tone detect	1:ON/2:OFF	ON	OK
732	Auto disconnect cancel time	1:350msec/2:1800msec/3:OFF	350msec	OK
771	T1 timer	1:35sec/2:60sec	35sec	OK
815	Sensor and check	"START" push	-----	NG
890	First ring back tone generate in TEL/FAX mode	1:ON/2:OFF	ON	OK
991	Transmit basic list	1:START	-----	OK
992	Transmit advanced list	1:START	-----	OK
994	Transmit journal report	1:START	-----	OK
999	Transmit service list	1:START	-----	OK

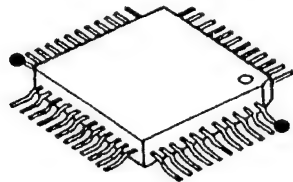
## HOW TO REPLACE FLAT PACKAGE IC

### ■ PREPARATION

- SOLDER ..... Sparkle Solder 115A-1, 115B-1  
OR  
Almit Solder KR-19, KR-19RMA
- Soldering iron ..... Recommended power consumption will be between 30 W to 40 W.  
Temperature of Copper Rod 662  $\pm 50$  °F(350  $\pm 10$  °C)  
  
(An expert may handle 60~80 W iron, but a beginner might damage the foil by overheating.)
- Flux ..... HI115      Specific gravity 0.863  
(Original flux will be replaced daily.)

### ■ PROCEDURE

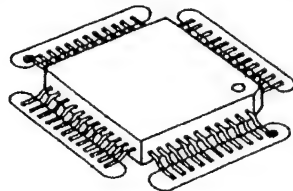
1. Temporarily fix the FLAT PACKAGE IC by Soldering on two marked pins.



● ..... Temporary soldering point.

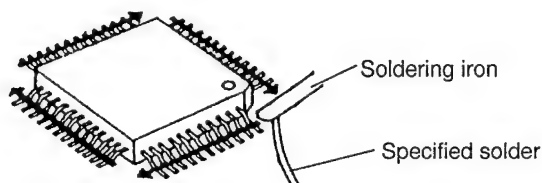
\*Accurate setting of the IC to the corresponding soldering foil is vital.

2. Apply flux to the all pins of the FLAT PACKAGE IC.



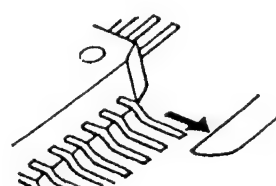
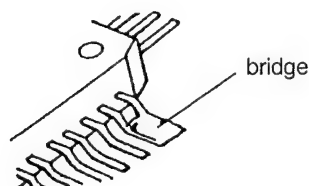
○ ..... Flux

3. Solder the specified solder in the direction of the arrow, while slide the soldering iron.



### ■ MODIFICATION PROCEDURE OF BRIDGE

1. Re-solder slightly on bridged portion.
2. Remove any remaining solder along the pins using soldering iron as shown below.



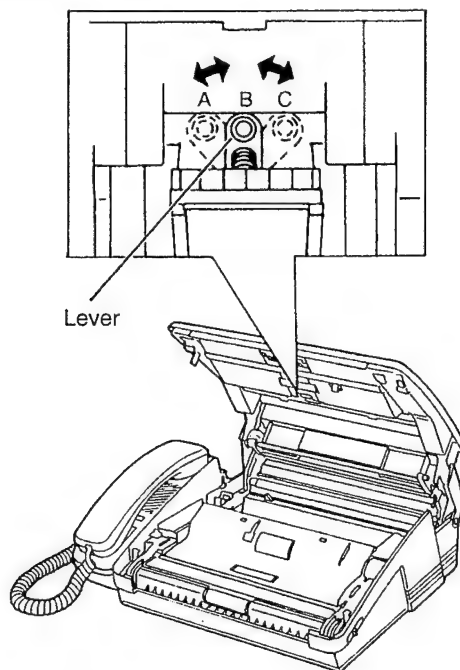
## ADJUSTMENTS

### 1. TABLE OF TEST EQUIPMENTS AND TOOL

No.	Test Equipment and Jig Name	Jig No.
1	Oscilloscope	—
2	CCD Tool	PQZZF500M
3	Extension Cord	PQZZ2K12Z, PQZZ8K18Z
4	Spring Height Tool	PQZZ2F500M

### 2. ADJUSTING THE FEEDER PRESSURE

If misfeeding of document, such a multiple feeding or no feeding, occurs frequently, try to adjust the feeder pressure by following steps below.



- (1) Open the top cover.
- (2) Shift the position of the lever by using an instrument with a pointed end, like a clip or ball-point pen.  
Position A: Case of no feeding  
Position B: Standard position  
Position C: Case of multiple feeding
- (3) Close the top cover carefully by pressing down on the ends gently.

### 3. CONFIRMATION OF SEPARATION SPRING

1. Open the operation grille.
2. Check the highest level of the separation spring with the spring height tool (PQZZ2F500M). Please make sure that the separation spring does not touch the tool during this operation. (Both right and left) (See Fig. 1).
3. Check the lowest level of the separation spring with the opposite side of the spring height tool. Please make sure that the separation spring touches the tool during this operation. (Both right and left) (See Fig. 2).

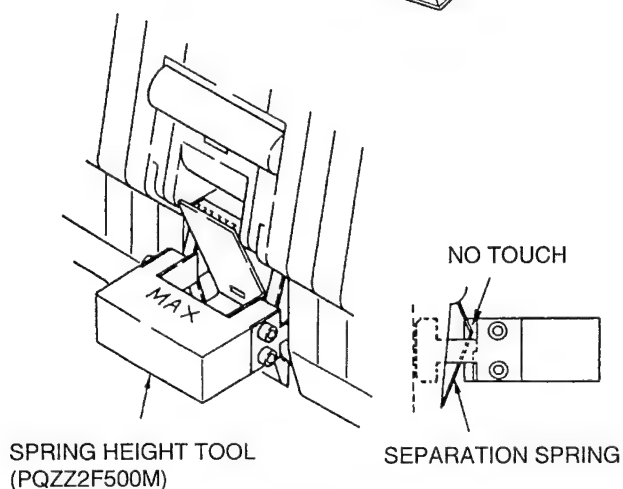


Fig. 1

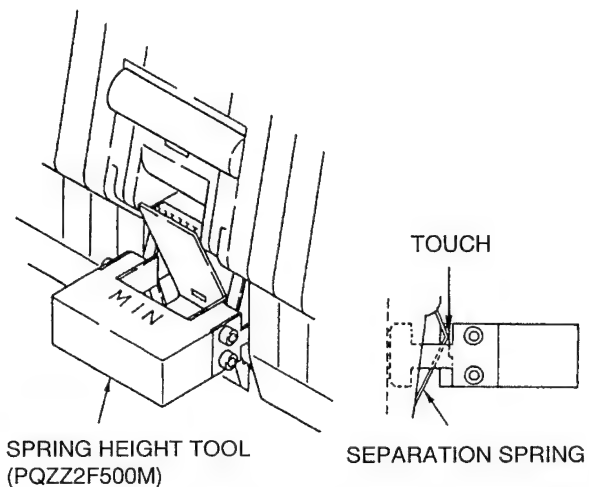


Fig. 2

## 4. CCD ADJUSTMENTS

Perform the following adjustment after replacing lens and CCD board.

### PREPARATION:

- 1) Remove the CCD unit from set. (Refer to page 70)
- 2) Make oscilloscope connections as shown in next page.
- 3) Attach the CCD TOOL on the CCD unit.
- 4) Connect between CCD unit and digital board with extension cord (Part No. PQZZ8K18Z). (Refer to next page).
- 5) Connect between LED array and digital board with extension cord (Part No. PQZZ2K12Z). (Refer to next page).
- 6) Connect AC cord.
- 7) Press the MENU button.
- 8) Press the #,9,0,0,0, and  $\times$  buttons.
- 9) Press the 5,5 and 5 buttons.

### Notes:

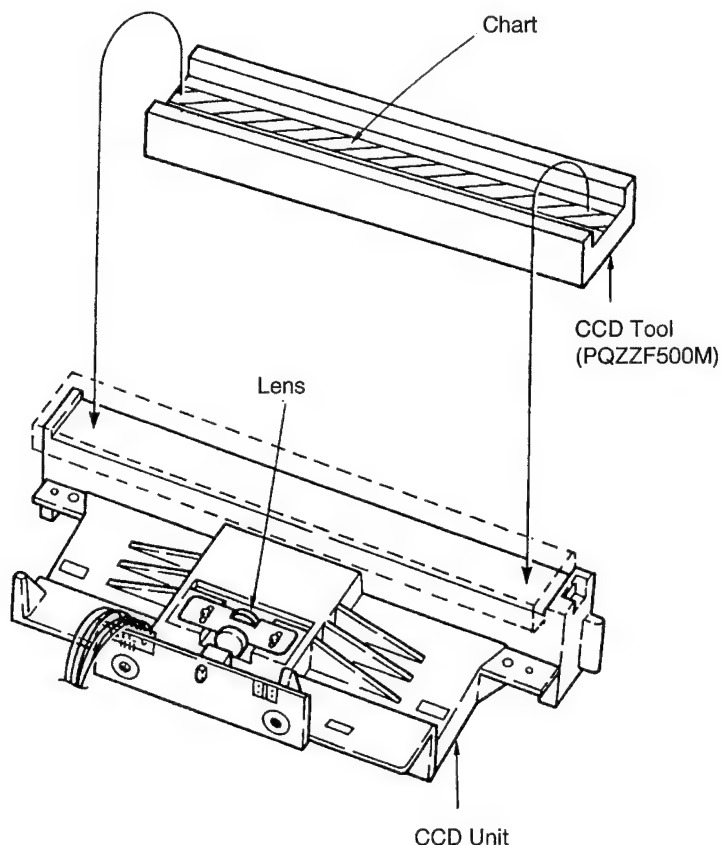
- 1) When replacing the lens, pay attention to the markings on the lens are white and yellow.  
The number of the CCD spacers to use differs depending on the marking as follows.  
\*Refer to page 172 for the location of the CCD spacer.

- 2) Install the lens so that the marking (White or Yellow) on it is upper side.
- 3) Do not touch the glass face of the lens with the bare hands.

### Cleaning:

If the lens is dirty, clean it with a dry soft cloth.

Marking on the lens	Number of CCD Spacer
White	0 (not used)
Yellow	1

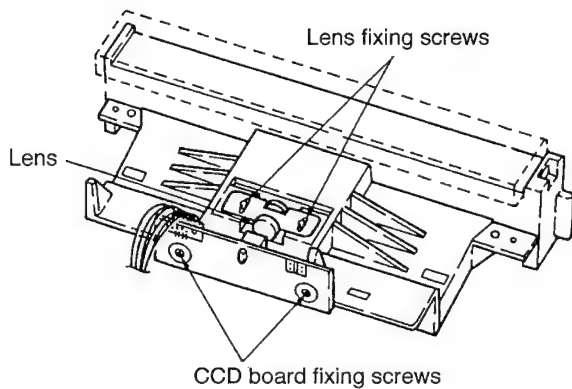
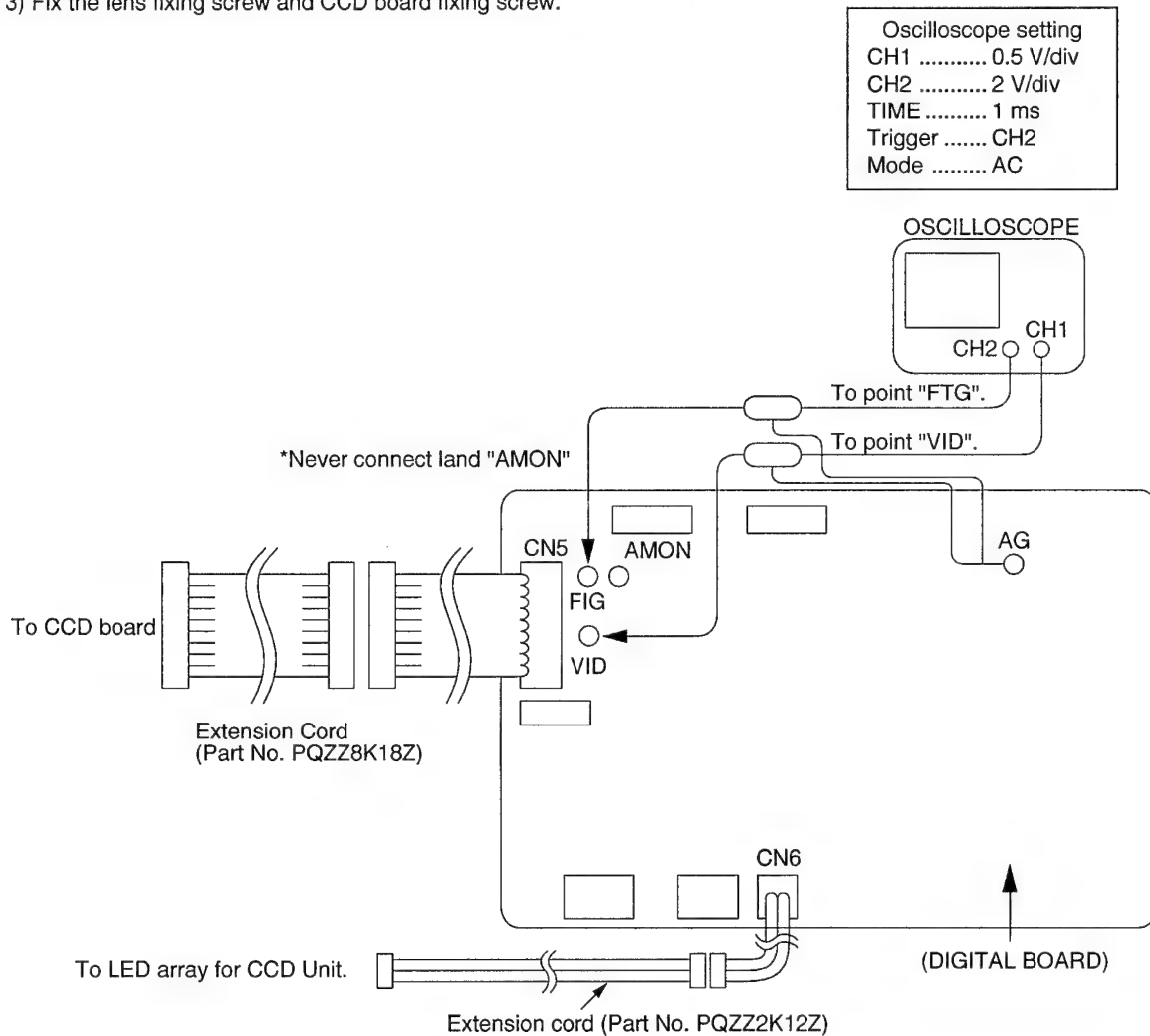
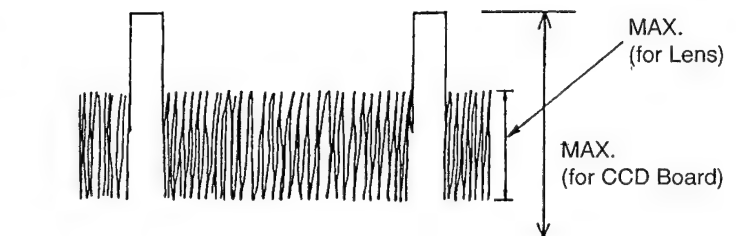


### Note:

Please adjust with covering topside of the lens by hands in order not to let in outdoor daylight.

**ADJUSTMENT:****LENS AND CCD READ POSITION ADJUSTMENT**

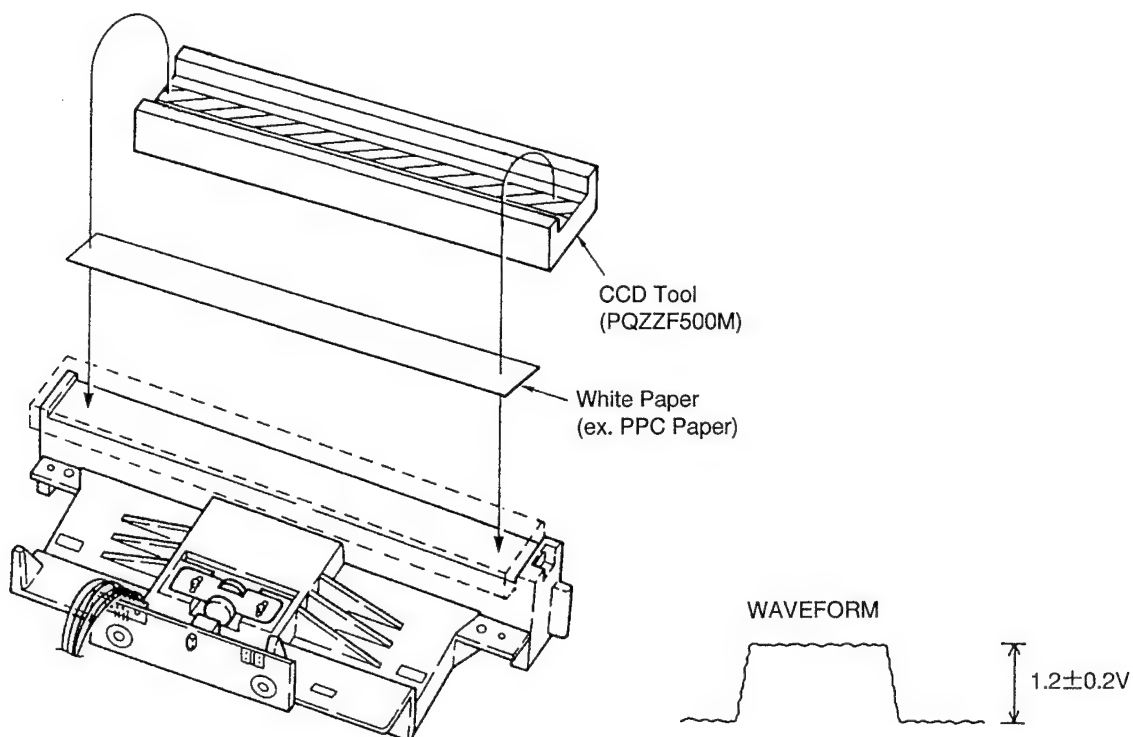
- 1) Loosen the lens fixing screw and CCD board fixing screw.
- 2) Adjust the position of the lens and CCD board so that the waveform appears as shown in the figure below.
- 3) Fix the lens fixing screw and CCD board fixing screw.

**WAVEFORM**

**WHITE LEVEL ADJUSTMENT**

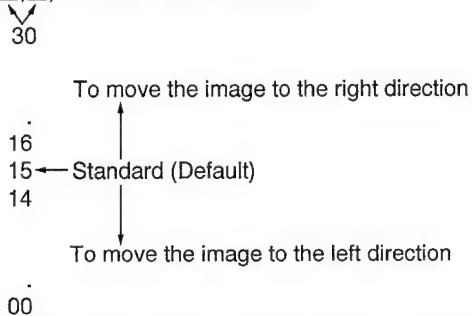
- 1) Remove the CCD TOOL from CCD unit.
- 2) Attach the white paper on the CCD unit.
- 3) Attach the CCD TOOL on the CCD unit.
- 4) Adjust VR801 on the CCD board so that the waveform becomes  $1.2 \pm 0.2V$ .

**Notes:** 1. After the adjustment is finished, assemble the unit by reversing above procedure.  
 2. Please adjust with covering topside of the lens by hands in order not to let in outdoor daylight.  
 3. If you have no instrument to repair, trim off the chart on next page, then attach on the target glass.  
 (This is a temporary treatment. You should use an instrument for this adjustment purpose, if you require an accurate repairment.)



**5. DOCUMENT READ START POSITION ADJUSTMENT**

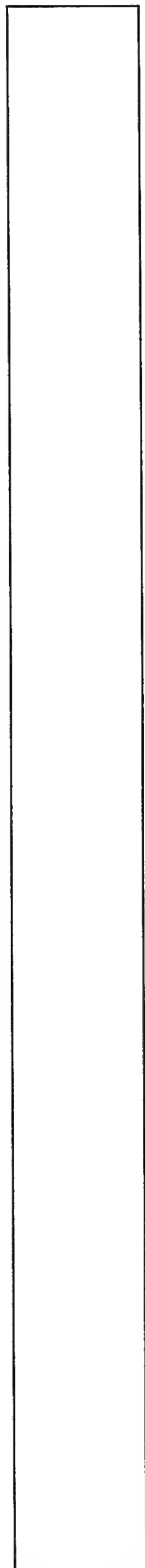
- 1) Connect AC cord.
- 2) Copy the document, and confirm the read start position of the document.
- 3) If get out of position, adjust the read position.
- 4) Press the MENU button.
- 5) Press the #, 9, 0, 0, 0, \* and 5, 6, 3 buttons.
- 6) Press the ☐, ☐, SET and MENU buttons.



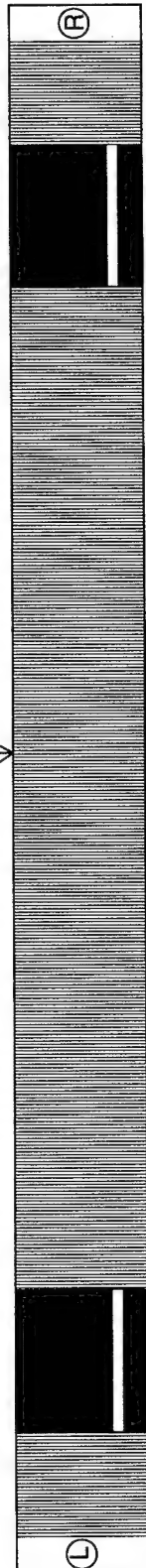
The starting position of reading shifts 1 mm as number of changes.

(for white level adjustment)

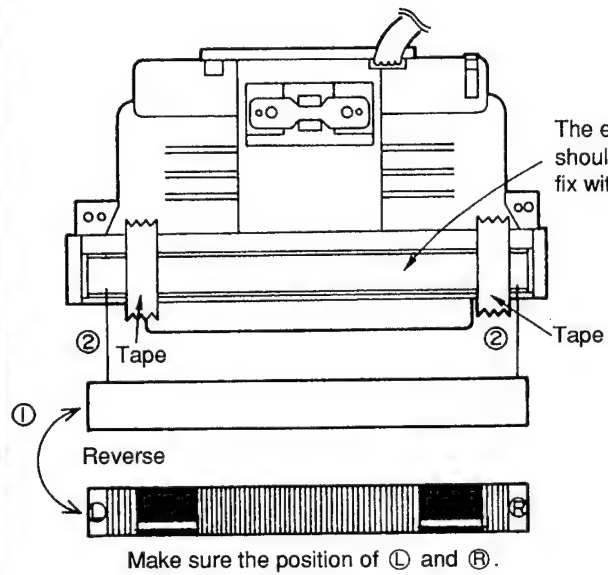
(for lens and CCD read position adjustment)



LED Array →  
Side



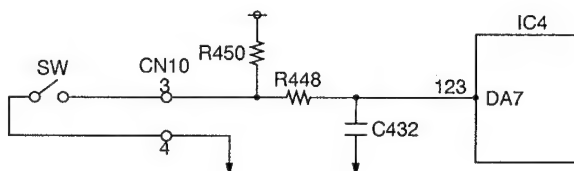
← edge of the glass



KX-F2200E-G/KX-F2200E-W

**[Anti Curl Position Switch]**

When an anti-curl shaft is set to home position, SW becomes ON and IC4-123 pin (Digital) becomes low level.



	SW	IC4-123 pin
Home Position	ON	Low level
No Home Position	OFF	High level

## 4. MODEM SECTION

### 4-1. FUNCTION

The unit uses a 1 chip modem (IC5), enabling it to act as an interface between the control section for FAX sending and receiving, and the telephone line. During a sending operation, the digital image signals are modulated and sent to the telephone line, while during a receiving operation, the analog image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by ITU-T. This 1 chip modem (IC5) has hardware which sends and detects all of the necessary signals for FAX communication.

It can be controlled by writing commands from the CPU (IC1) to the register in the modem (IC5).

This modem (IC5) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.

Overview of Facsimile Communication Procedures (ITU-T Recommendation):

#### 1) ON ITU-T (International Telecommunications Union)

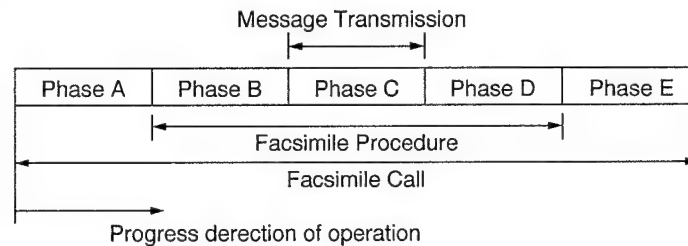
The No. XIV Group of ITU-T, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimile.

#### 2) Definition of Each Group

- Group I (G1)  
A-4 size documents official without using formats which reduce the band width of signal sent over telephone lines.  
Determined in 1968.  
Transmission for about 6 minutes at scanning line density of 3.85 lines/mm.
- Group II (G2)  
Using reduction technology in the modulation/demodulation format, A-4 size document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.  
Methods to suppress redundancy are not used.  
Determined in 1976.
- Group III (G3)  
Method of suppressing redundancy in the image signal prior to modulation is used. A-4 size document is sent within about one minute.  
Determined in 1980.
- Group N (G4)  
Transmission is via data network. Method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.  
The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communications methods, it can be expected to expand to include integrated services.

### 3) Facsimile Call Time Series

As shown in the following diagram, the facsimile call time series is divided into five phases.



#### Phase A : Call setting

Call setting can be manual/automatic.

#### Phase B : Pre-message procedure

Phase B is a pre-processing procedure and a sequence for confirming status of terminal, transmission route, etc. and for terminal control. It implements terminal preparation status, determines and displays terminal constants, confirms synchronization status, etc. and prepares for transmission of facsimile messages.

#### Phase C : Message transmission

Phase C is the procedure for transmission of facsimile messages.

#### Phase D : Post message procedure

Phase D is the procedure for confirming that the message is completed and received. In the case of continuous transmission, return is made repeatedly to phase B or phase C for transmission.

#### Phase E : Call retrieval

Phase E is the procedure for call retrieval, that is, for circuit disconnection.

### 4) Concerning Transmission of Time

$$\text{Transmission Time} = \text{Control Time} + \text{Image Transmission Time} + \text{Hold Time}$$

Transmission time consists of the following.

**Control time :** This is time at the start of transmission when functions at the sending and receiving sides are confirmed, transmission mode is established, and transmission and reception are synchronized.

#### Image transmission time:

This is the time required for transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

**Hold time:** This is the time required after the document contents have been sent to confirm that the document was in fact sent, and to check for telephone reservations and/or the existence of continuous transmission.

### 5) Facsimile Standard

Item	Telephone Network Facimile
	G3 Machine
Connection Control Mode	Telephone Network Signal Mode
Terminal Control Mode	T. 30 Binary
Facsimile Signal Format	Digital
Modulation Mode	PSK (V. 27 ter) or QAM (V. 29)
Transmission Speed	300 bps (control Signal) 2400, 4800, 7200, 9600 bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension : MH Mode 2 dimension : MR Mode (K=2.4)
Resolution	Main Scan : 8 pel/mm Sub Scan : 3.85, 7.7l/mm
Line Synchronization Signal	EOL Signal
1 Line Transmission Time [ms/line]	Depends on degree of data reduction. Minimum Value : 10, 20 Can be recognized in 40ms.

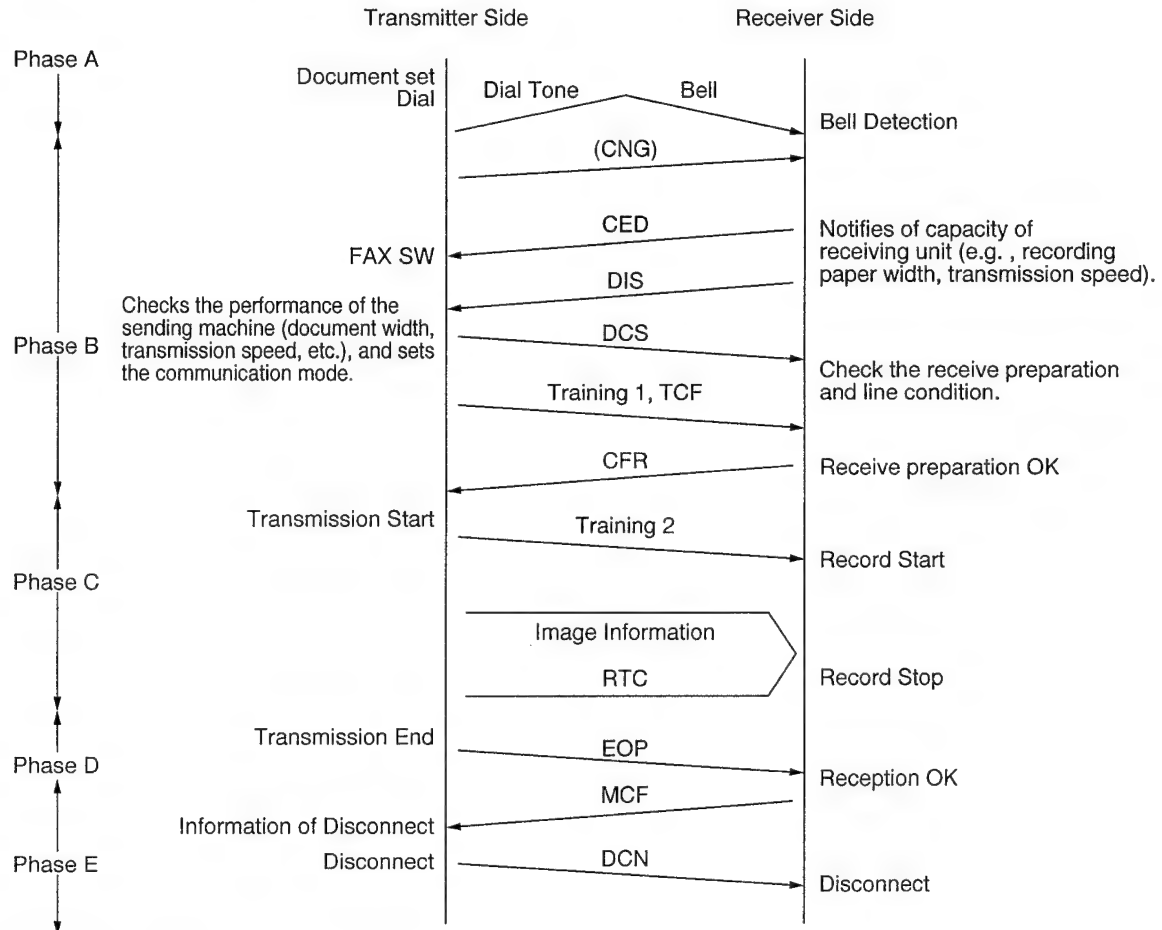
## 6) Explanation of Technology

### (1) G3 Communication Signals (T. 30 Binary Process)

In G3 Facsimile communication, this is the procedure for exchange of control signals between the sending and receiving machines both before and after transception of image signals.

Control signals at 300 bps FSX are: 1850 Hz...0, 1650Hz...1.

An example of binary process in G3 communication is shown below.



### Explanation of Signals

Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal)

Function:

Identification Signal Format.....00000001

Notifies of capacity of receiving unit

The added data signals are as follows.

(Example)

Bit No.	DIS/DTC	DCS
1	Transmitter - T. 2 operation	
2	Receiver - T. 2 operation	Receiver - T. 2 operation
3	T.2 IOC = 176	T. 2 IOC = 176
4	Transmitter - T. 3 operation	
5	Receiver - T. 3 operation	Receiver - T. 3 operation
6	Reserved for future T. 3 operation features	

Bit No.	DIS/DTC	DCS
7	Reserved for future T.3 operation features	
8	Reserved for future T.3 operation features	
9	Transmitter - T.4 operation	
10	Receiver - T.4 operation	Receiver - T.4 operation
11, 12 (0, 0) (0, 1) (1, 0) (1, 1)	Data signalling rate V.27 ter fallback mode V.27 ter V.29 V.27 ter and V.29	Data signalling rate 2400 bit/s V.27 ter 4800 bit/s V.27 ter 9600 bit/s V.29 7200 bit/s V.29
13	Reserved for new modulation system	
14	Reserved for new modulation system	
15	Vertical resolution = 7.7 line/mm	Vertical resolution = 7.7 line/mm
16	Two-dimensional coding capability	Two-dimensional coding
17, 18 (0, 0) (0, 1) (1, 0) (1, 1)	Recording width capabilities 1728 picture elements along scan line length of 215 mm $\pm$ 1% 1728 picture elements along scan line length of 215 mm $\pm$ 1% and 2048 picture elements along scan line length of 255 mm $\pm$ 1% and 2432 picture elements along scan line length of 303 mm $\pm$ 1% 1728 picture elements along scan line length of 215 mm $\pm$ 1% and 2048 picture elements along scan line length of 255 mm $\pm$ 1% Invalid (see Note 7)	Recording width 1728 picture elements along scan line length of 215 mm $\pm$ 1% 2432 picture elements along scan line length of 303 mm $\pm$ 1% and  2048 picture elements along scan line length of 255 mm $\pm$ 1% and  Invalid
19, 20 (0, 0) (0, 1) (1, 0) (1, 1)	Maximum recording length capability A4 (297 mm) Unlimited A4 (297 mm) and B4 (364 mm) Invalid	Maximum recording length A4 (297 mm) Unlimited B4 (364 mm) Invalid

Signal.....DCS (Digital Command Signal)

Identification Signal Format.....X1000001

(Example)

Function:

Notifies of capacity of receiving machine obtained at DIS and announces the transmission mode of the sender. The added data signals are as follows.

Bit No.	DIS/DTC	Standard setting	DCS
21, 22, 23 (0, 0, 0) (0, 0, 1) (0, 1, 0) (1, 0, 0) (0, 1, 1) (1, 1, 0) (1, 0, 1) (1, 1, 1)	Minimum scan line time capability at the receiver 20 ms at 3.851/mm: T7.7=T3.85 40 ms at 3.851/mm: T7.7=T3.85 10 ms at 3.851/mm: T7.7=T3.85 5 ms at 3.851/mm: T7.7=T3.85 10 ms at 3.851/mm: T7.7=1/2 T3.85 20 ms at 3.851/mm: T7.7=1/2 T3.85 40 ms at 3.851/mm: T7.7=1/2 T3.85 0 ms at 3.851/mm: T7.7=T3.85		Minimum scan line time 20 ms 40 ms 10ms 5ms    0ms

**KX-F2200E-G/KX-F2200E-W**

Bit No.	DIS/DTC	Standard setting	DCS
24	Extend field	1	Extend field
25	2400 bit/s handshaking	0	2400 bit/s handshaking
26	Uncompressed mode	0	Uncompressed mode
27	Error correction mode	0	Error correction mode
28	Set to "0"	0	Frame size 0 = 256 octets 1 = 64 octets
29	Error limiting mode	0	Error limiting mode
30	Reserved for G4 capability on PSTN	0	Reserved for G4 capability on PSTN
31	Unassigned	0	
32	Extend field	1	Extend field
33 (0) (1)	Validity of bits 17,18 Bits 17,18 are valid Bits 17,18 are invalid	0	Recording width Recording width indicated by bits 17,18 Recording width indicated by this field bit information
34	Recording width capability 1216 picture elements along scan line length of 151 mm $\pm$ 1%	0	Middle 1216 elements of 1728 picture elements
35	Recording width capability 864 picture elements along scan line length of 107 mm $\pm$ 1%	0	Middle 864 elements of 1728 picture elements
36	Recording width capability 1728 picture elements along scan line length of 151 mm $\pm$ 1%	0	Invalid
37	Recording width capability 1728 picture elements along scan line length of 107 mm $\pm$ 1%	0	Invalid
38	Reserved for future recording width capability	0	
39	Reserved for future recording width capability	0	
40	Extend field	1	Extend field
41	Semi super time / mm	1	
42	Semi super time / inch	0	
43	Super time	0	
44	inch	0	
45	mm	1	
46	MSC/SF	0	
47	Select polling	0	
48	EXT	0	

Note 1 - Standard facsimile units conforming to T.2 must have the following capability : Index of cooperation (IOC)=264.

Note 2 - Standard facsimile units conforming to T.3 must have the following capability : Index of cooperation (IOC)=264.

Note 1 - Standard facsimile units conforming to T.4 must have the following capability : Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	_____	Fixed pattern is transmitted to receiving side at speed (2400 to 9600 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.
TCF (Training Check)	_____	Sends 0 continuously for 1.5 seconds at the same speed as the training signal.
CFR (Confirmation to Receive)	X0100001	Notifies sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to sender. Sender then reduces transmission speed by one stage and initiates training once again.
Training 2	_____	Used for reconfirmation of receiving side the same as training 1.

Signal	Identification Signal Format	Function
Image Signal	Refer to next page.	
RTC (Return to Control)		Sends 12 bit (0...01 X 6 times to receiver at same speed as image signal and notifies of completion of transmission of first sheet.
EOP (End of Procedure)	X1110100	End of one communication
MCF (Message Confirmation)	X0110001	End of 1 page reception
DCN (Disconnect)	X1011111	Phase E starts.
MPS (Multi-Page Signal)	X1110010	Completion of transmission of 1 page. If there are still more documents to be sent, they are output instead of EOP. After MCF reception, sender transmits image signal of second sheet.
PRI-EOP (Procedural Interrupt-EOP)	X1111100	If there is an operator call from the sender, it is output after RTC.
PIP (Procedural Interrupt Positive)	X0110101	Output in the case of operator call from receiver.

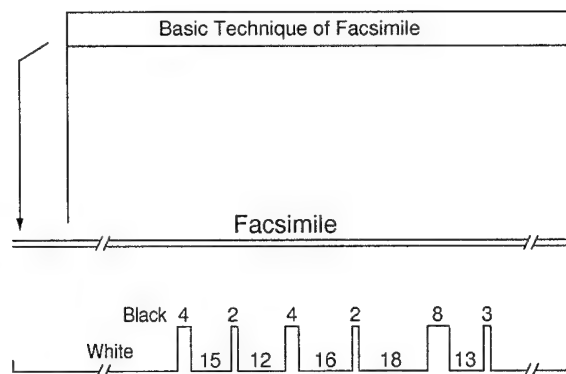
(2) Redundancy Compression Process Coding Mode  
This set uses one-dimensional MH format.

(a) Document

(b) Part of document

(c) Run length and image signals equivalent to (b)

(d) Codification of (c) according to MH formula



Modified Huffman (MH) Code		
Run length	Code for White Line	Code for Black Line
0	00110101	000011011
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

00110111101010 011 110101 11 001000 011 101010  
(White 400) (Black 4) (White 15) (Black 2) (White 12) (Black 4) (White 16)

11 0100111 000101 000011 10  
(Black 2) (White 18) (Black 8) (White 13) (Black 3)

(c) Total bit number before MH codification (497 bit)  
(d) Total bit number after MH codification (63 bit)

**4-2. MODEM CIRCUIT OPERATION**

The modem (IC5) has all the hardware satisfying the ITU-T standards mentioned previously.

When the gate array IC4 (73) is brought to low level, the modem (IC5) is chip-selected and resistors inside IC are selected by select signals from CPU (IC1) A0-A4, commands are written through data bus, and all processing is controlled at the CPU (IC1) according to ITU-T procedures. Here the signal INT dispatched from IRQ (pin 52 of IC5) to the CPU (IC1) and gate array IC4 is output when preparation for acceptance of transmission data is OK and when demodulation of reception data is complete; the CPU (IC1) implements post processing.

This modem (IC5) has an automatic application equalizer. With training signal 1 or 2 at time of G3 reception, it can automatically establish the optimum equalizer. Also, the modem (IC5) generates an internal clock of 24.00014 MHz by means of an external crystal oscillator (X1).

**1) Facsimile Transmission/DTMF Line Send / Beep Line Send**

The digital image data on the data bus is modulated in the modem (IC5), and sent from pin 44 via amplifier IC13 (6→7), the NCU section to the telephone line.

IC5(44) → C508 → R502 → IC13(6 → 7) → CN1(1) → C234 → R274 → NCU Section [R120 → C120 → IC102 (6 → 7) → R102 → R101 → T1] → TEL. Line.

**2) Facsimile Reception**

The analog image data which is received from the telephone line passes through the NCU section and enters pin 45 of the modem (IC5). The signals that enter pin 45 of the modem (IC5) are demodulated in the board to digital image signals, then placed on the data bus.

In this case, the image signals from the telephone line are transmitted serially. Hence they are placed on the bus in 8 bit units. Here, internal the equalizer circuit reduces the image signals to the long-distance receiving level.

It is designed to correct the characteristics of the frequency band centered about 3 KHz and maintain a constant receiving sensitivity.

It can be set in the service mode.

TEL. Line → NCU Section → CN1(2) → C521 → R509 → IC13(2 → 1) → C519 → R507 → IC5(45)

**3) DTMF Transmission (Monitor tone)**

The DTMF signal generated in the modem (IC5) is output from pin 44, then passes through the analog switch IC112 pins (11-3), and the NCU section to the telephone line as same as facsimile transmission signals.

**(DTMF Monitor Tone)**

IC5(44) → C508 → R502 → IC13 (6 → 7) → CN1 (1) → C236 → C278 → R258 → IC112 (11 → 13) → R196 → C181 → IC111 (4) → IC111 (8, 5) → Speaker

**4) Call Tone Transmission**

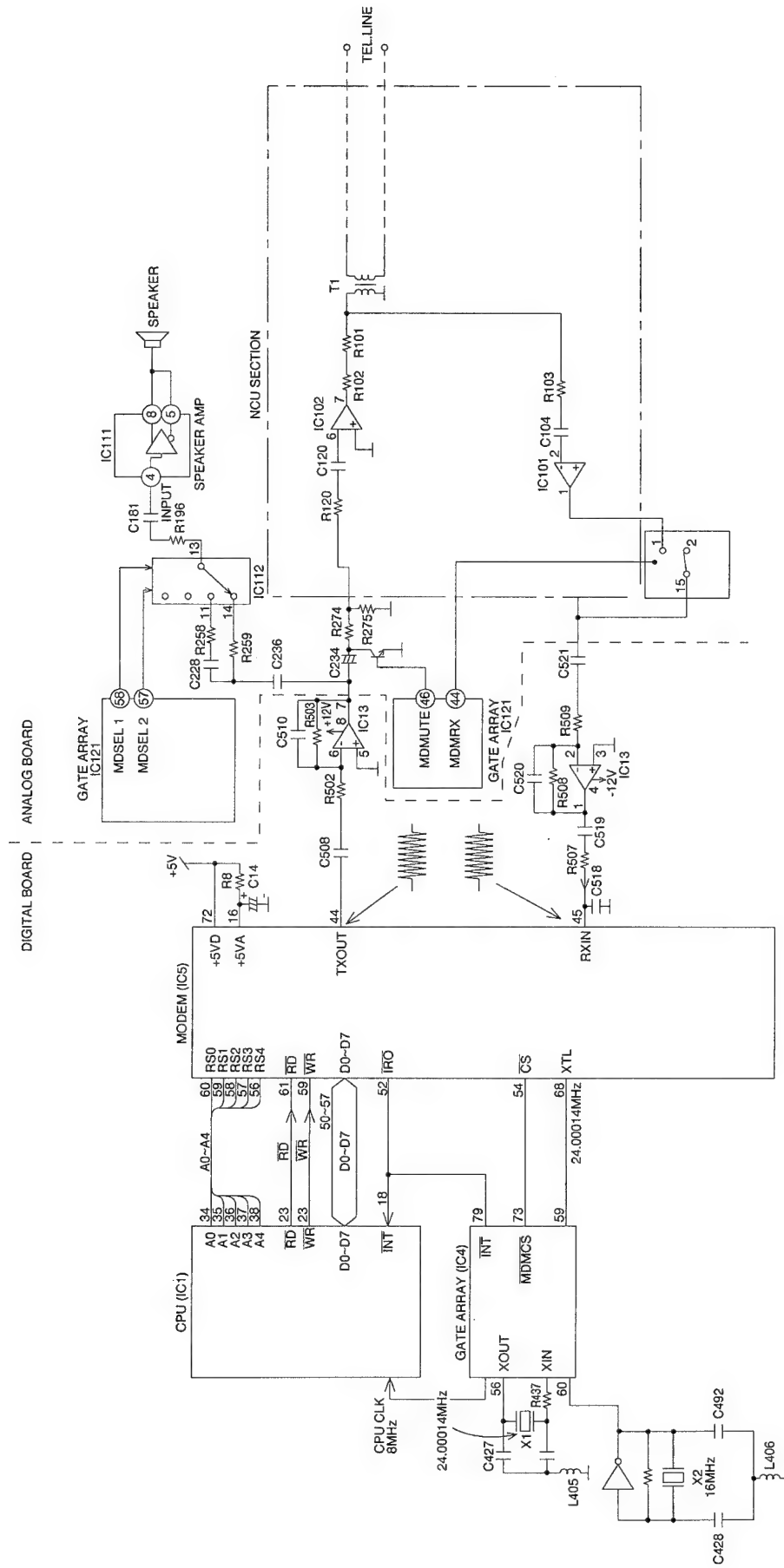
The call signal which is generated in the modem (IC5) passes through analog switch IC112 (14 → 13) and IC111 (4 → 8, 5) to the speaker.

IC5 (44) → C508 → R502 → IC13 (6 → 7) → CN1 (1) → C236 → R259 → IC112 (14 → 13) → R196 → C181 → IC111 (4) → IC111 (8, 5) → Speaker

**5) Busy/Dial Tone Detection**

The path is the same as for FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC5) becomes 1, and this status is monitored by CPU (IC1).

Circuit Diagram



## 7. ITS (Integrated Telephone System) AND MONITOR SECTIONS

### 7-1. GENERAL

The general ITS operation is executed by the special IC109. This IC has a speakerphone circuit and a handset circuit in 1 chip, and control to each mode is executed from the outside (IC121). At the time of speakerphone operation, the speaker output passes through the power amplifier of the special Power Amp IC (IC111). The DTMF signal, the line transmission beep, and the bell tone are output from the modem (IC5) and distributed by the analog switch (IC112). The alarm tone, the key tone, and the beep are output from the gate array IC4. At the time of pulse dial operation, the monitor tone is output from the gate array IC121.

### 7-2. SPEAKERPHONE CIRCUIT

#### 1) Function

This circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

#### 2) Circuit Operation

The speakerphone can only provide a one-way communication path.

In other words, it can either transmit an outgoing signal or receive an incoming signal at a given time, but cannot do both simultaneously. Therefore, a switching circuit is necessary to control the flow of the outgoing and incoming signals.

This switching circuit is contained in IC109 and consists of voice detector, TX attenuator, RX attenuator, comparator, and attenuator control. The circuit analyzes whether the TX (transmit) or the RX (receiver) signal is louder, and then it processes the signals such that the louder signal is given precedence.

The voice detector provides a DC input to the attenuator control corresponding to the TX signal. The comparator receives a TX and RX signals, and supplies a DC input to the attenuator control corresponding to the RX signal.

The attenuator control provides a control signal to the TX and the RX attenuator to switch the appropriate signals ON and OFF. The attenuator control also detects the level of the volume control to automatically adjust for changing ambient conditions.

#### (Transmission Signal Path)

The input signal from the microphone is sent through the circuit via the following path:

MIC → C145 → R277 → IC109 [(13) → MIC AMP → SW4 → TX ATT → (27)] → R282 → C124 → R130 → IC102 (2)(1) → R117 → C117 → NCU Section [IC102 (6)(7)] → Telephone Line.

#### (Reception Signal Path)

Signals received from the telephone line are outputted at the speaker via the following path:

Telephone Line → NCU Section [IC101 (2)(1)] → R126 → Q102 → C144 → R151 → IC109 [(22) → SW3 → RX ATT → (30)] → C157 → IC109 [(4) → SW5 → SP AMP → (7)] → C178 → R193 → IC111 → SP

#### (Control Signal Path)

Control signals for transmission and reception are inputted to IC109 via following path:

(Transmission Control Signal Path)

MIC → C145 → R277 → IC109 [(13) → MIC AMP → SW4 → (31)] → C155 → R167 → IC109 [(1) → AMP → Comparator]

(Reception Control Signal Path)

Telephone Line → NCU Section [IC101 (2)(1)] → R126 → Q102 → C144 → R151 → IC109 [(22) → SW3 → RX ATT → (30)] → C157 → IC109 [(4) → SW5 → SP AMP → (7)] → C152 → R168 → IC109 [(3) → AMP → Comparator]

#### (Voice Detector)

The transmission signal given as input from the microphone to IC109 pin (1) passes through the built-in amplifier and enters the voice detection circuit for judgment of voice noise. In case of noise, the TX attenuator is made effective via the attenuator control.

#### (Attenuator Control)

The attenuator control detects the setting of the volume control through pin 11 of IC109 to automatically adjust for changing ambient conditions.

### 7-3. HANDSET CIRCUIT

#### 1) Transmission Signal

Handset MIC → R88 → C80 → IC4 (16)(4) → R75 → RLY1-2 (B → C) → Q2 → TEL LINE

#### 2) Reception Signal

TEL LINE → Q1 → RLY1-2 (C → B) → F75 → R80 → R81 → C62 → R84 → C71 → R93 → IC4 (12)(9) → C68 → R95 → Handset Speaker

## 7-4. MONITOR CIRCUIT

### 1) DTMF Monitor

#### (Speaker operation)

CN1 (1) → C236 → C228 → R258 → IC112 (11)(13) → R196 → C181 → IC111 (4) → (5)(8) → Speaker

#### (Handset operation) DTMF monitor

Power ON:

CN1 (1) → C234 → R274 → R120 → C120 → NCU [IC102 (6)(7)] → T1 → RLY2 → R58 → R61 → C49 → R70 → IC4 (10)(9) → Handset speaker

Power failure:

IC3 (18) → C41 → R41 → R45 → C45 → R70 → IC4 (10)(9) → Handset speaker

### 2) DTMF Signal for Line Transmission

CN1 (1) → C234 → R274 → R120 → C120 → NCU [IC102 (6)(7)] → TEL Line

When handset is OFF-HOOK, NCU [IC102 (6)(7)] → T1 → RLY2 → IC4 (14)(4) → TEL Line

When handset is OFF-HOOK and Power down → IC3 (18) → C41 → R40 → R44 → R46 → C46 → IC4 (14)(4) → TEL Line

### 3) Ring Tone

#### (Modem output...EXT. TAM, FAX, TEL MODE)

CN1 (1) → C236 → R259 → IC112 (14)(13) → R196 → C181 → IC111 [(4) → (5)(8)] → Speaker

#### (Gate Array output...TEL/FAX MODE)

CN2 (9) → R262 → R256 → IC112 (12)(13) → R196 → C181 → IC111 [(4) → (5)(8)] → Speaker

### 4) Alarm/Beep, Keytone

CN2 (10) → R263 → C238 → R257 → IC112 (15)(13) → R196 → C181 → IC111 [(4) → (5)(8)] → Speaker

### 5) Dummy ring back tone for Line Transmission

IC4 (44) → Q2(B) → (C) → CN2 (8) → R125 → R122 → R121 → R119 → C119 → NCU [IC102 (6)(7)] → Telephone Line

IC4 (42) → R440

Digital Board

IC109 Control Table

		IC109 Input Logic			IC109 Internal Switch				
		S/H	RMUTE	TMUTE	SW1	SW2	SW3	SW4	SW5
Speakerphone Mode	Communication	1	0	0	×	×	○	○	○
	Transmission Mute	1	0	1	×	×	○	×	○
	Dial	1	1	1	×	×	×	×	○
Other		0	1	—	×	×	×	×	×

0: Low Level(0V)

1: High Level(5V)

O: ON

X: OFF

**Monitor Tone Control Table**

		S/H	RMU	TMU	SP MUTE	MD SEL1	MD SEL0	K. T/ ALM	DR SPH/L	BREAK	MODEM TX	TONE 1	TONE 2	DRING
Bell Ringing	Modem out	0	1	1	0	0	1	0	—	1	○			
	G/A out H	0	1	1	0	0	0	0	0	0			○	
	L	0	1	1	0	0	0	0	1	0			○	
Handset Tone Dial		0	1	1	1	1	1	0	—	0	○			
SP-Phone Tone Dial		1	1	1	0	1	1	0	—	0	○			
Handset Pulse Dial		0	1	1	1	0	0	0	—	1/0				
SP-Phone Pulse Dial		1	1	1	0	0	0	0	—	1/0				
Alarm Ringing		0	1	—	0	1	0	0	—	—		○		
Beep Ringing		0	1	—	0	1	0	1	—	—		○		
Dummy Ring Back Tone		0	1	1	0	0	0	0	—	0				○

## 7-5. ELECTRONIC VOLUME

Speakerphone volume and ringer volume can be switched with the volume key on the Operation Panel.

SP Phone RX...Low ←→ High (8 step)

Switch analog SW IC110 ON/OFF. Concerning control please refer to the table.

Ringer Vol.

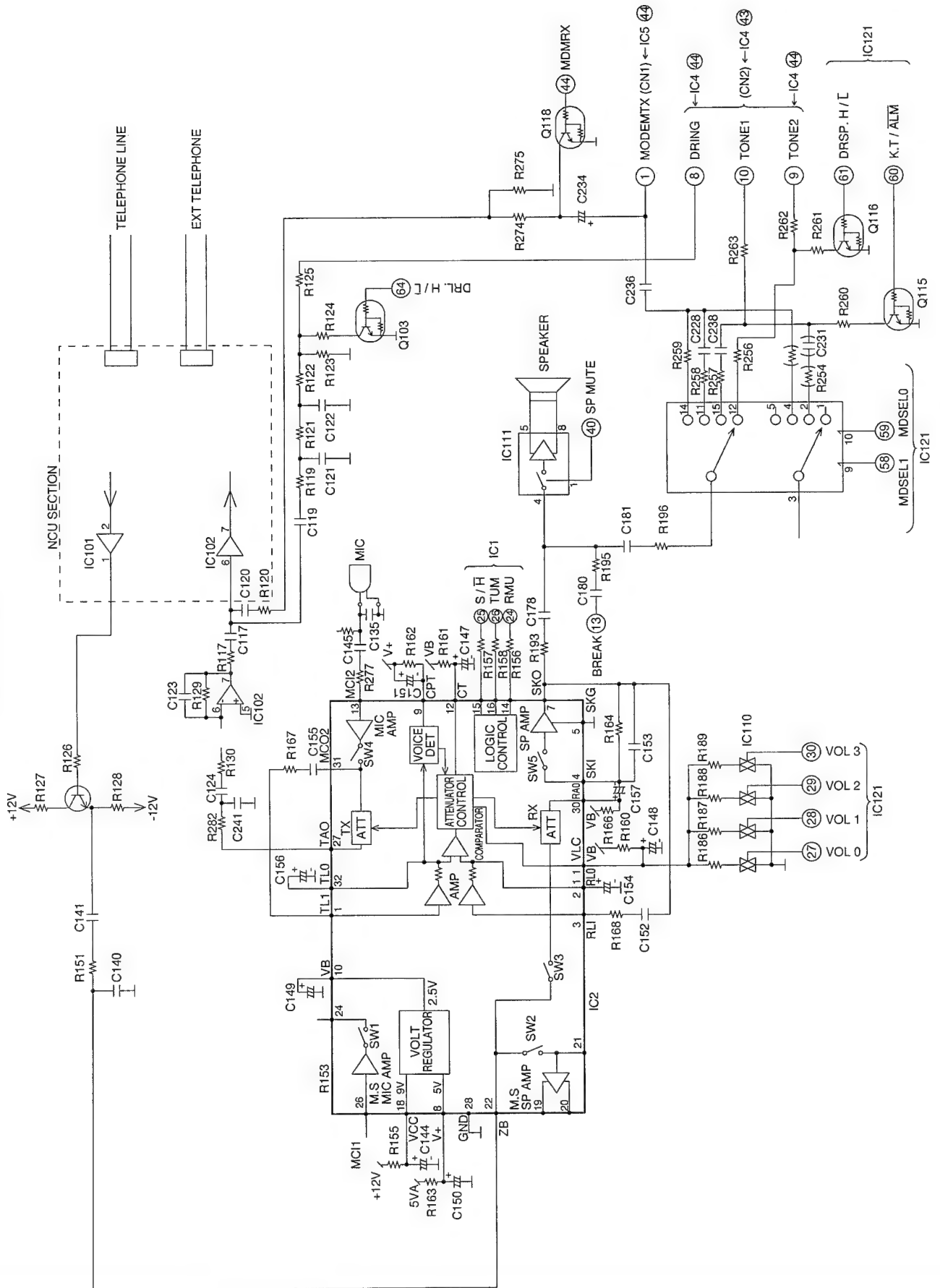
i) Modem output.....Modem output is switched with software's control.

ii) Gate Array output.....Monitor Circuit. (Please refer to 129.)

**Electronic Volume Control Table**

			VOL1	VOL2	VOL3	VOL4
SP-Phone	Loud ↑ ↓ Quiet	8	0	0	0	0
		7	1	0	0	0
		6	0	1	0	0
		5	1	1	0	0
		4	0	1	1	0
		3	1	1	1	0
		2	0	1	0	1
		1	1	0	1	1

Circuit Diagram



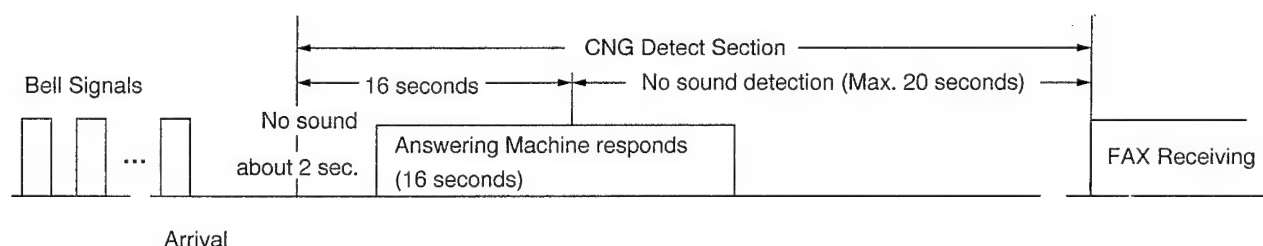
## 8. TAM INTERFACE SECTION

### 8-1. FUNCTION

In case that EXT. TAM position is selected in Receive mode, the unit receives documents for FAX call or the external TAM records a voice message automatically.

To switch between answering machine and facsimile in EXT. TAM Mode.

	OPERATION	EXPLANATION
	When bell signal rings as many as the numbers which installed in the connected answering machine, the answering machine seizes the line, then answering message is out to the line.	The length of response messages are 16 seconds. While response message is being played, the unit starts to detect CNG signal. When CNG signal is received, the unit switches to FAX receiving.
	16 seconds after the answering machine gets the telephone call, no-sound detection begins.	When there is approximately 4 seconds' no sound situation for 20 seconds after being passed 16 seconds, the unit switches to FAX receiving. During this period it detects CNG signal also. When it cannot detect no-sound nor CNG, it doesn't switch to FAX receiving, the unit doesn't catch the line. (The answering system hangs up the line.)



**Attention 1:** No sound detection lasts 20 seconds after the telephone call coming in to the answering machine. If there is no sound situation for more than 4 seconds it is switched to the facsimile.

**Attention 2:** When answering machine can't catch the telephone call because of the disconnection or no capacity in the tape, the unit catches the call after 5 times' bell ring, then switches to facsimile. When you install in user, it is possible for the unit not to catch phone calls.

## 8-2. CIRCUIT OPERATION

TAM INTERFACE circuit consists of EXT. TAM HOOK detection circuit, CNG signal from the party's detection circuit, VOX detection circuit (to judge sound/no-sound) and RLY1 (to separate EXT. TAM).

### 1) EXT. TAM HOOK detection circuit

The bell comes to EXT. TAM and EXT. TAM seizes the line, causing to make DC LOOP. IC1 detects this loop current. During detection IC1 (5) or (6) becomes low.

(DC LOOP)

a → L5 → EXT TEL (a') → (EXT.TAM) → EXT TEL (b') → R27 → J17 → RLY1 (B→C) → IC1 (2 → 1) → R2 → L6 → POS1 → b

### 2) CNG signal detection circuit

CNG signal from the party's FAX is detected in MODEM IC5 (digital board).

(Signal path)

Telephone Line → RLY1 → C11 → T2 → IC107 (14)(12) → C232 → R265 → IC108 (2)(1) → IC107 (2)(15) → CN1 (2)

excepting: → C232 → R265 →

↓  
→ C131 → R145 →

### 3) VOX

VOX circuit detects if there is a signal or voice in the line. That's why VOX circuit reacts to OGM of EXT.TAM and ICM from the party.

(Signal path)

Telephone Line → RLY1 → C11 → T2 → IC107 (14)(12) → C232 → R265 → IC108 (2)(1) → IC107 (2)(15) → R183 → C133 → IC107 (3)(4) → IC113 (16) [comparator] (2) → IC121 (34)

EXT.TEL Line → R27 →

### 4) RLY 1

Normally this relay switches to the external telephone side (break) and it switches to the open side (make) when the set changes to facsimile communication from EXT.TAM operation.

IC121 (48) High Level → Q104 (ON) → RLY1 (make)

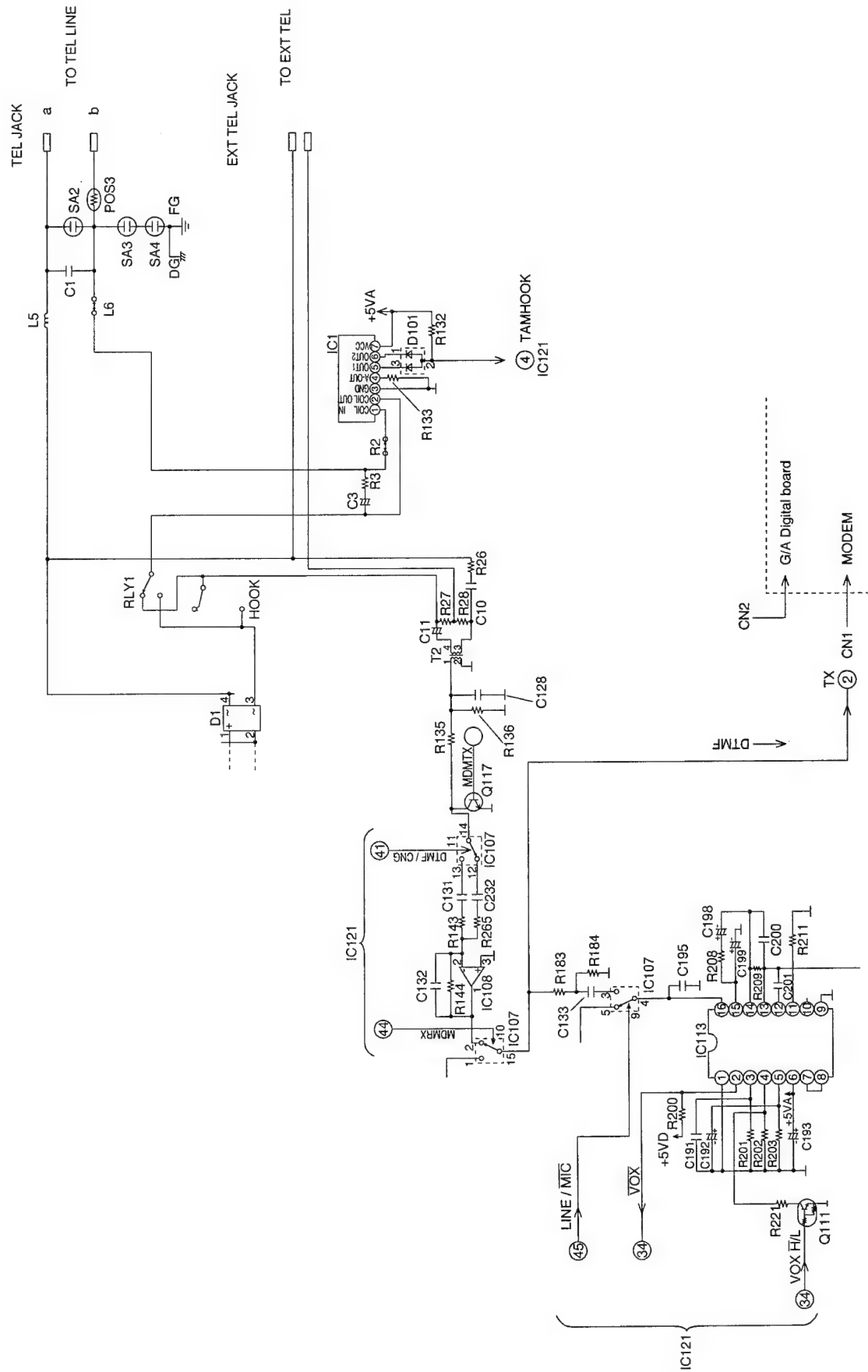
### 5) Remote receiving

This is the DTMF signal of EXT.TEL between a and b. When the party is FAX, this turns unit to FAX receiving.

(Signal Path)

To detect DTMF signal in MODEM.

Circuit Diagram

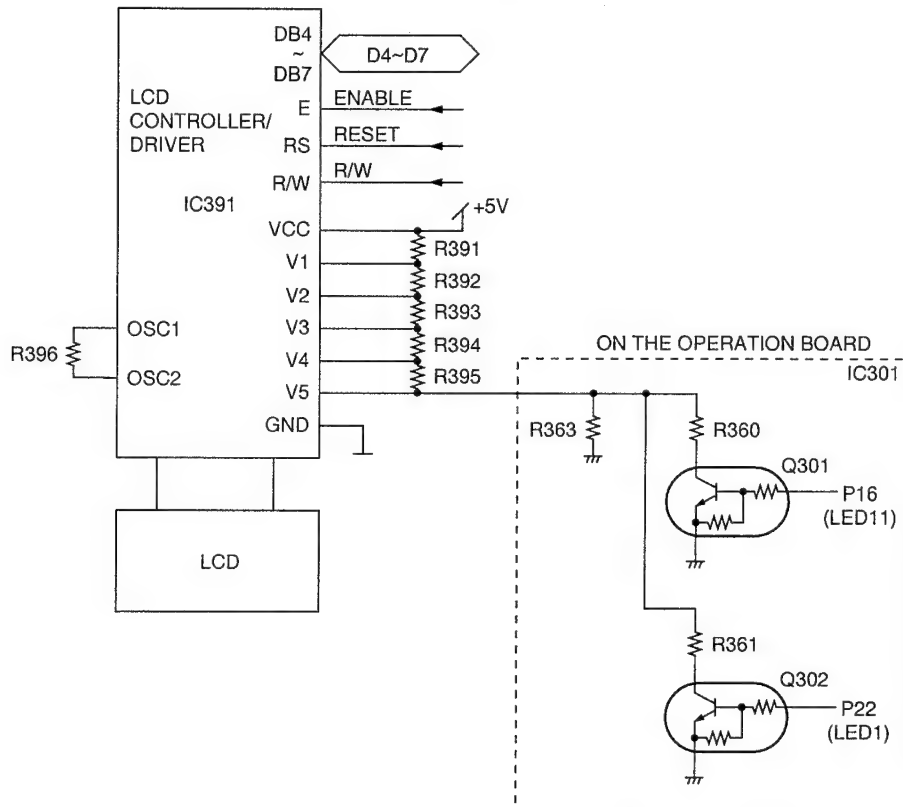


## 10 LCD CONTROLLER (IC391)

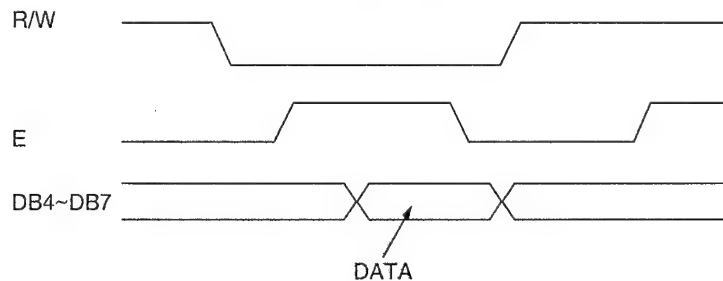
This IC is a chip with LCD controller and driver built in. The Gate Array (IC301) needs only write ASCII code from the data bus (D4~D7). V1 through V5 are power supplies for crystal drive. R360, R361, R363 are density control resistors and R396 is an externally applied resistance for internal oscillation circuit.

Consequently, in this set the timing (mainly positive clock) is generated by the LCD interface circuitry of the gate array (IC301).

Circuit Diagram



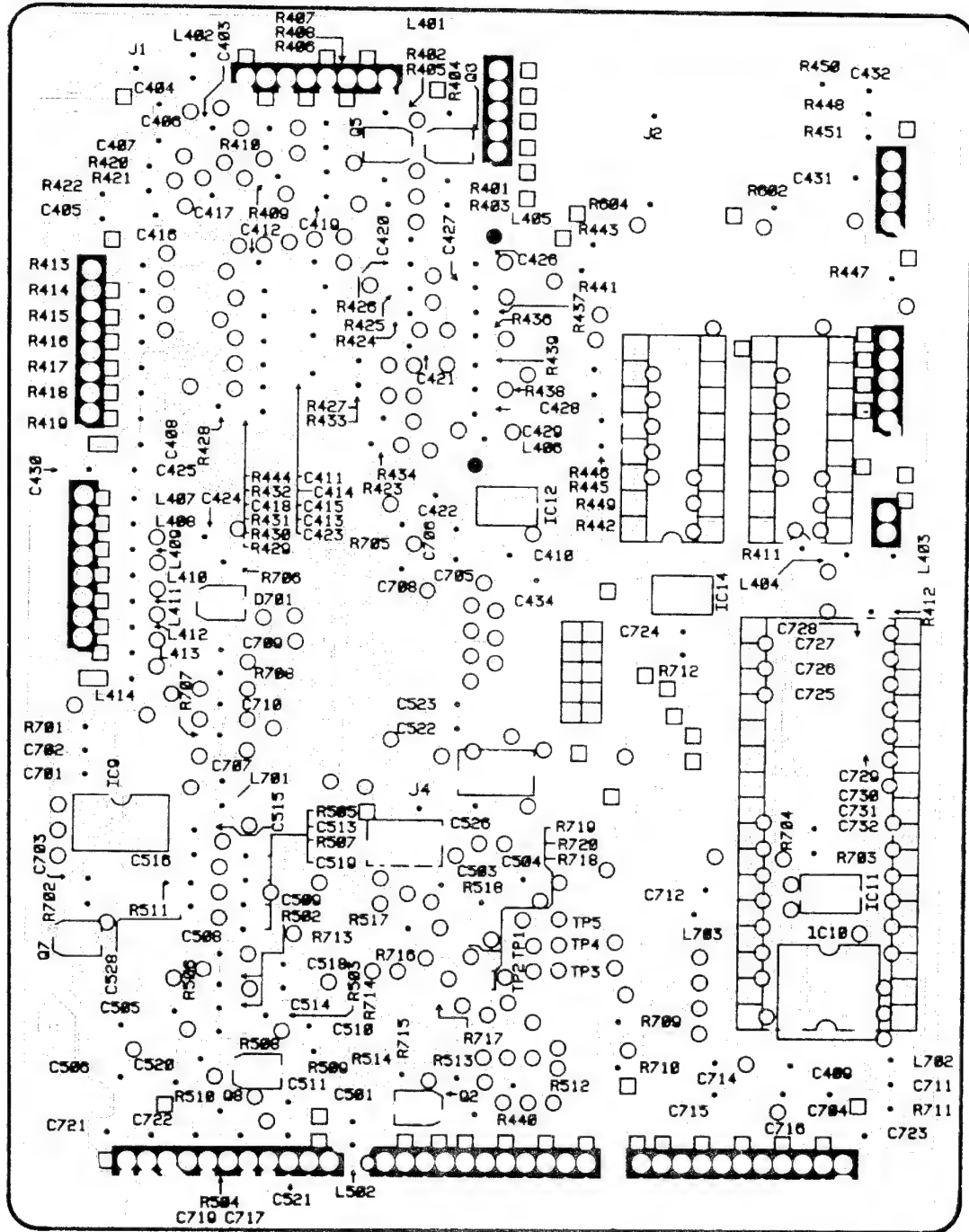
Timing Chart



Density	Light(2)	Normal(1)	Dark(3)	Service Mode 565 (1, 2, 3)
P16	L	H	H	
P22	L	L	H	

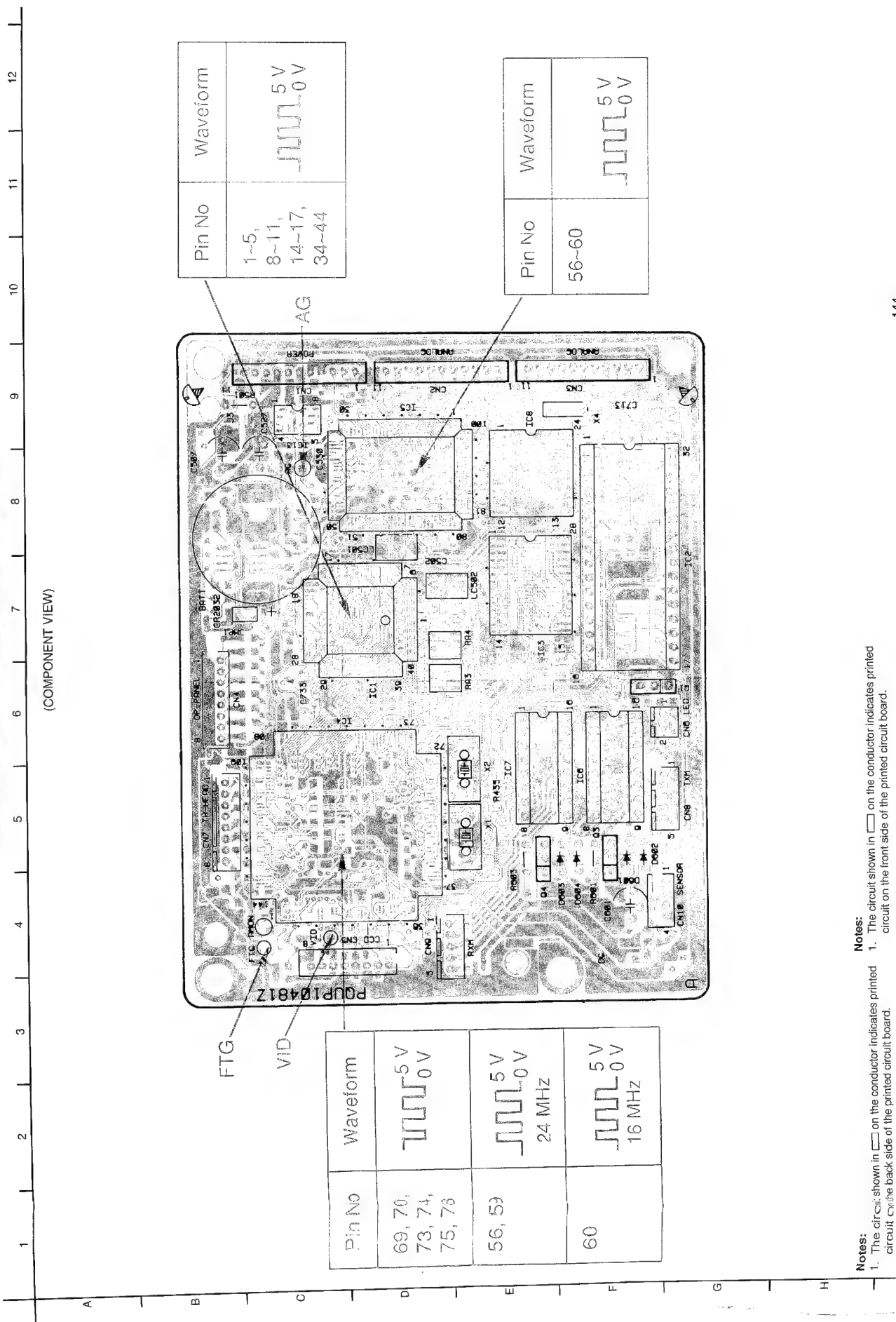
PRINTED CIRCUIT BOARD (DIGITAL BOARD)

(BOTTOM VIEW)




Notes:  
1. The circuit shown in  on the conductor indicates printed circuit on the back side of the printed circuit board.

## PRINTED CIRCUIT DIAGRAM (DIGITAL BOARD)



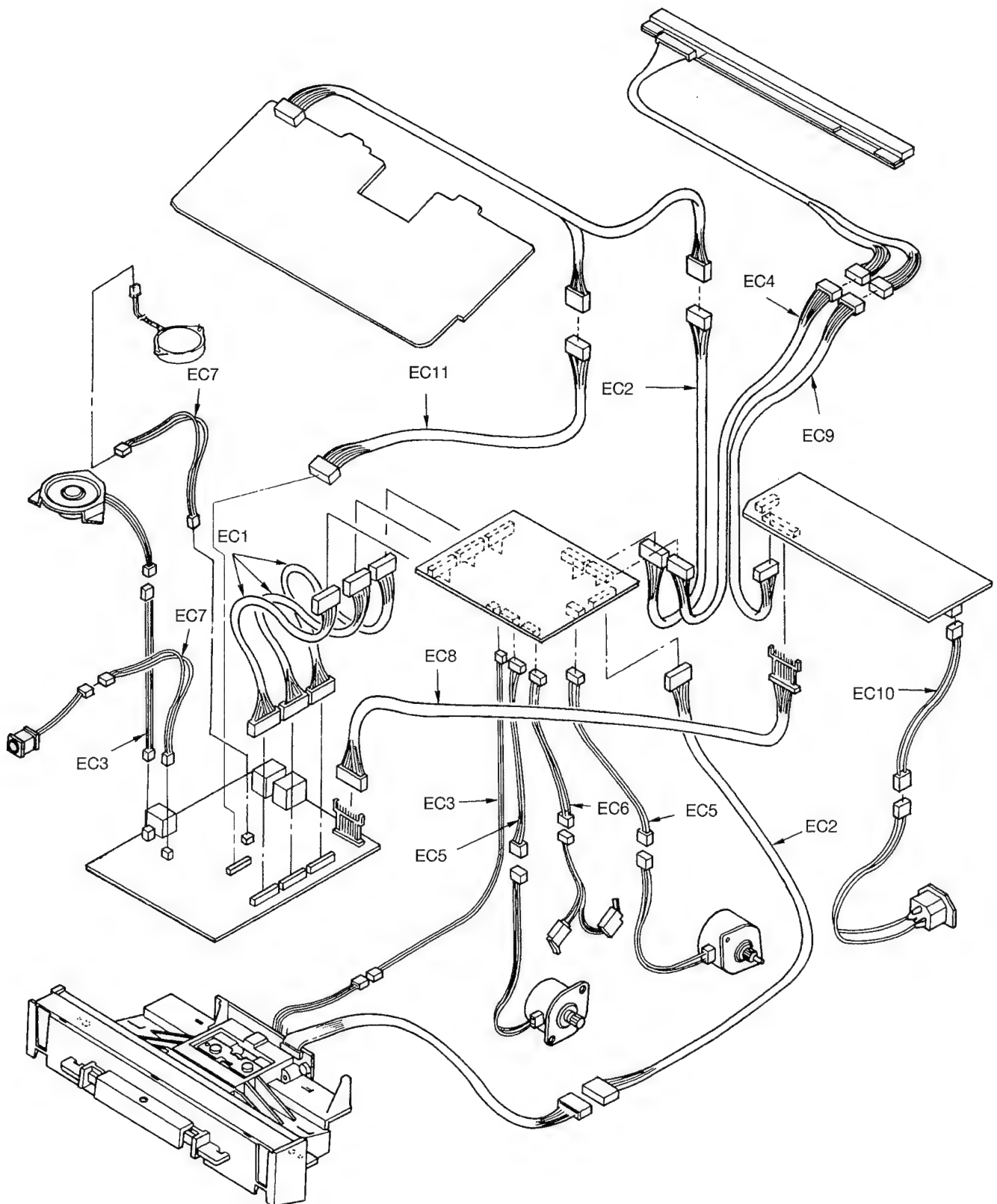
**Notes:**

- Notes:**
1. The circuit shown in  on the conductor indicates printed circuit on the front side of the printed circuit board.

**Notes:**

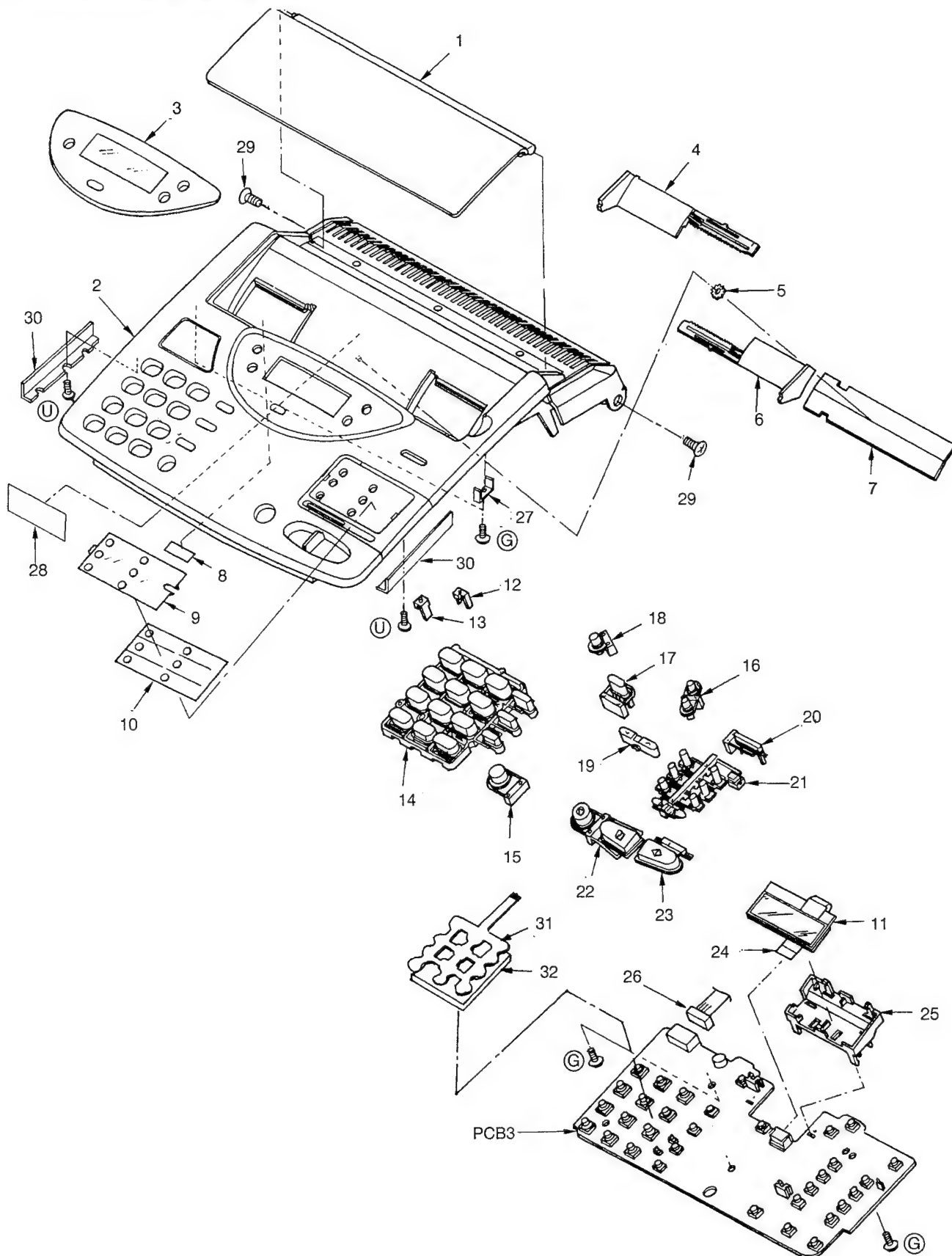
- Notes:**
1. The circuit shown in  on the conductor indicates printed circuit on the back side of the printed circuit board.

# TOOLS

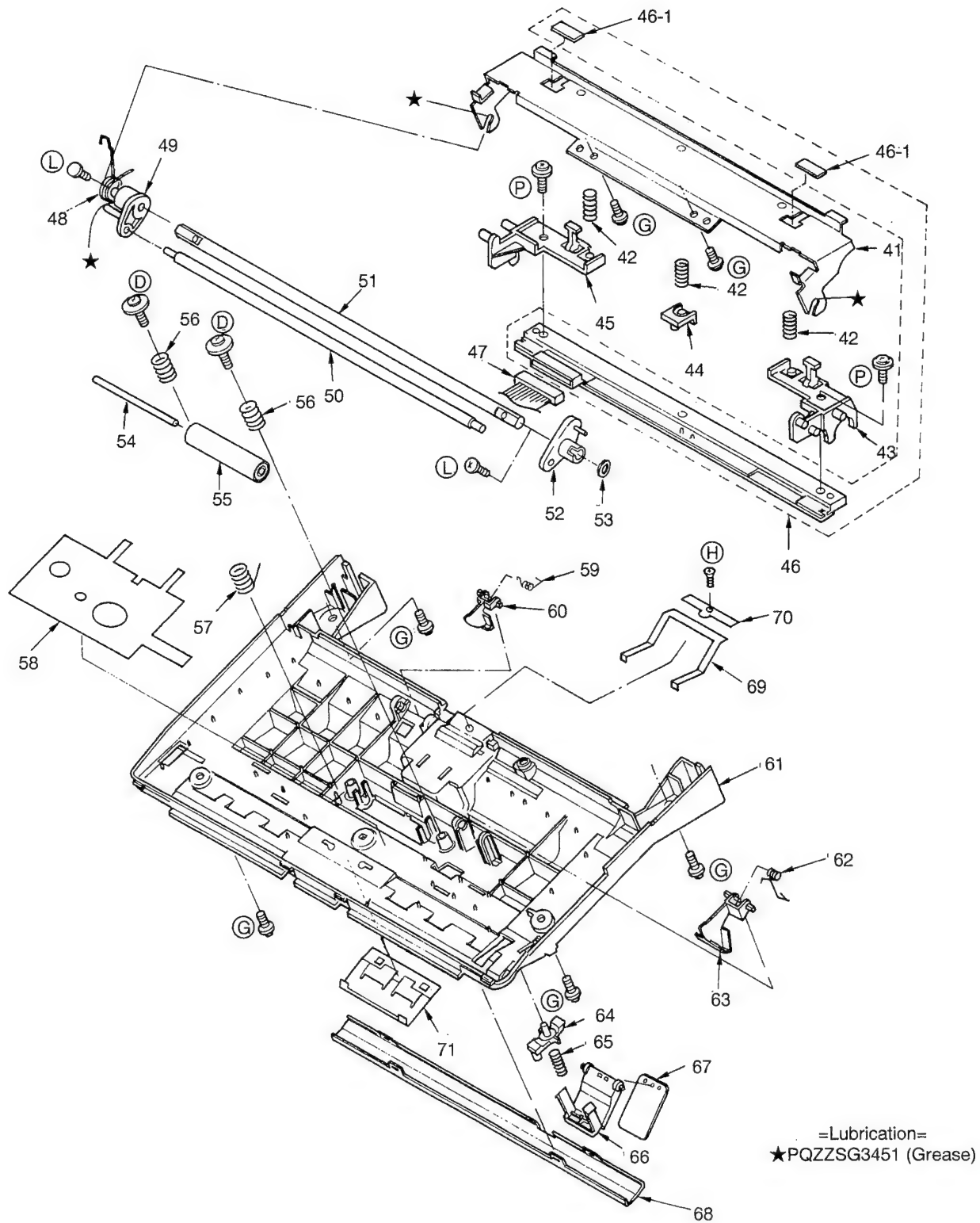


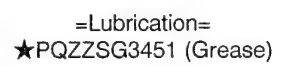
## CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

### 1. OPERATION PANEL SECTION

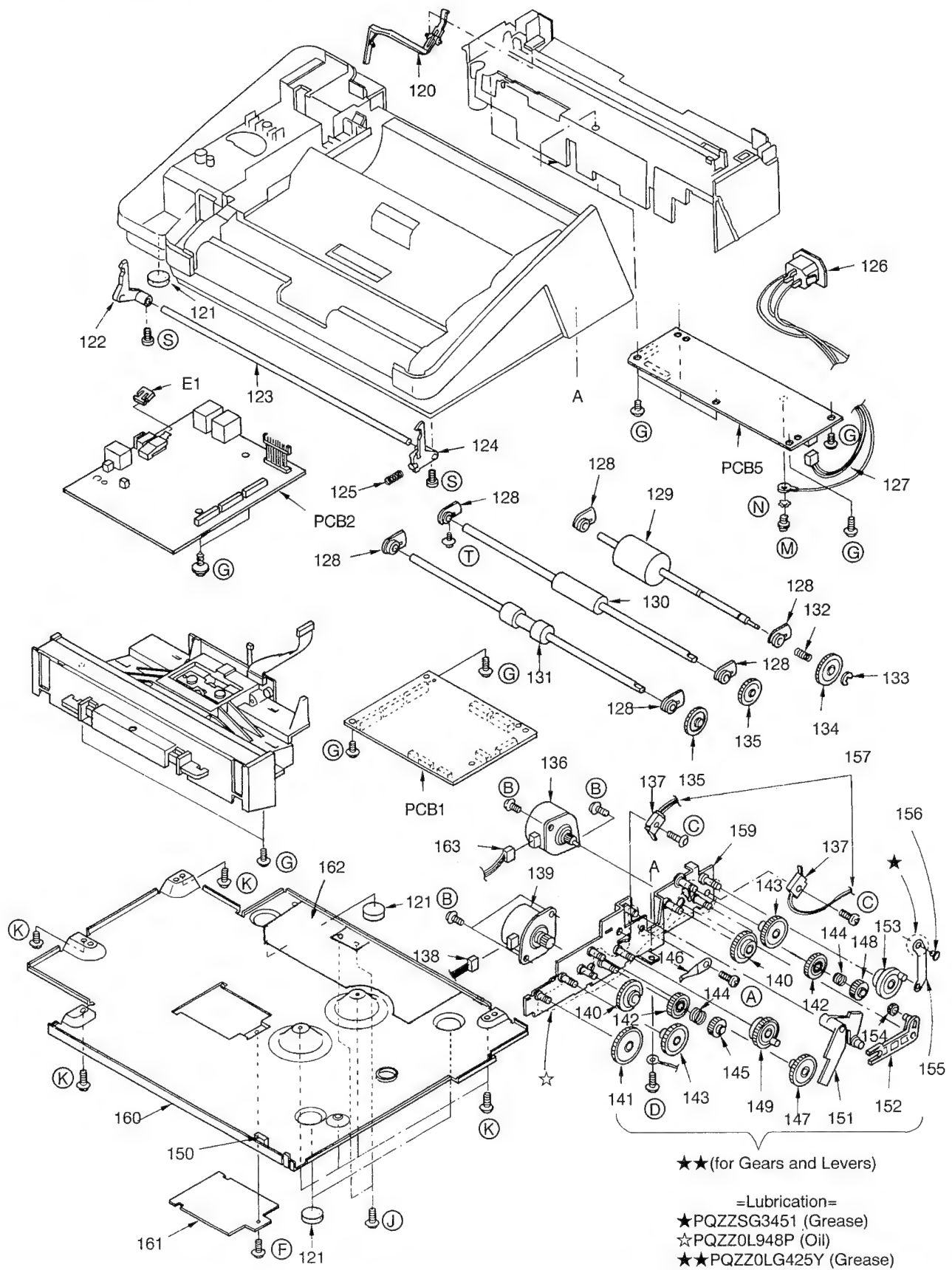


## 2. THERMAL HEAD SECTION

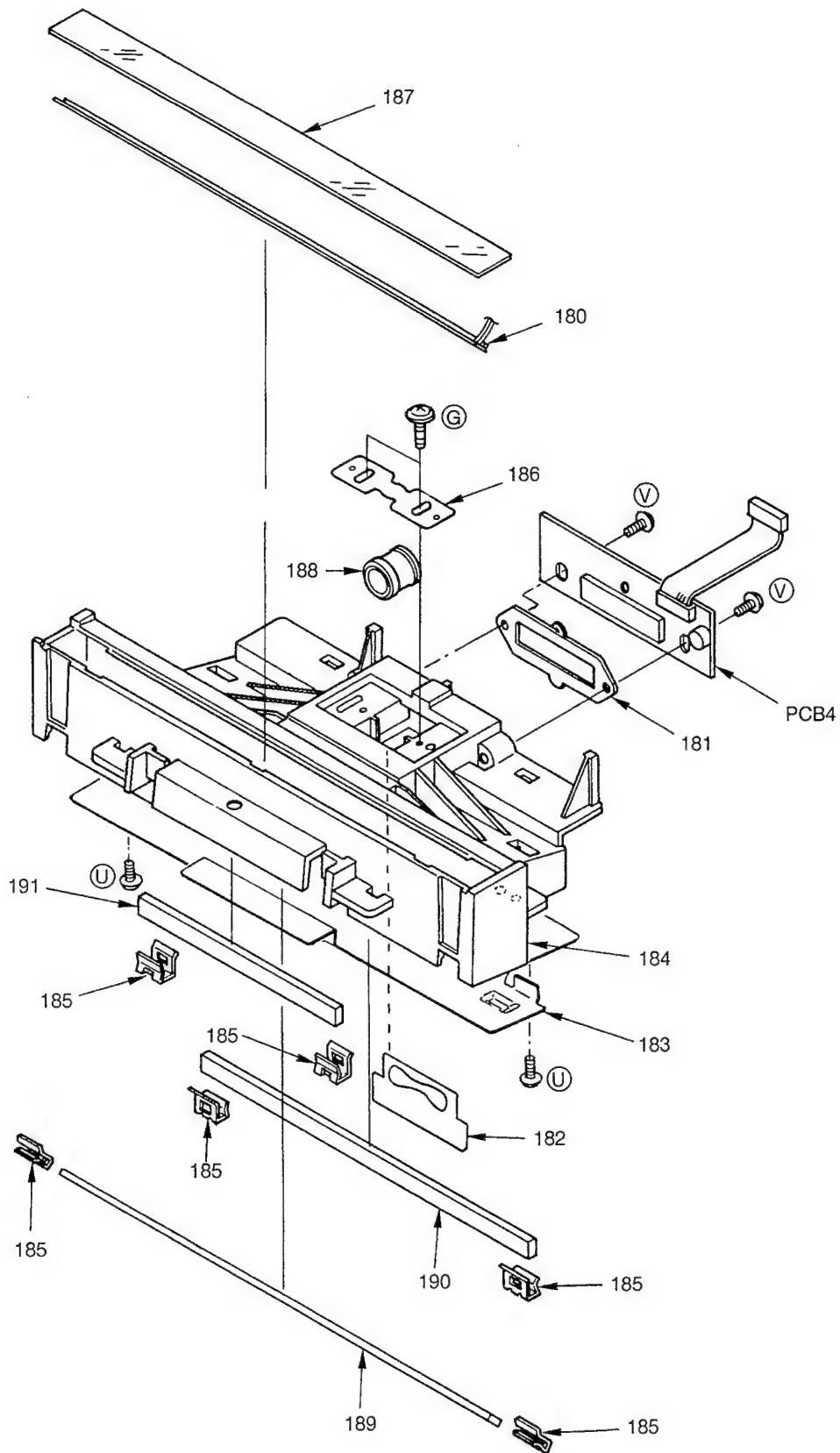





















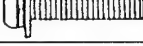


# 4. LOWER BODY SECTION



5. CCD UNIT SECTION

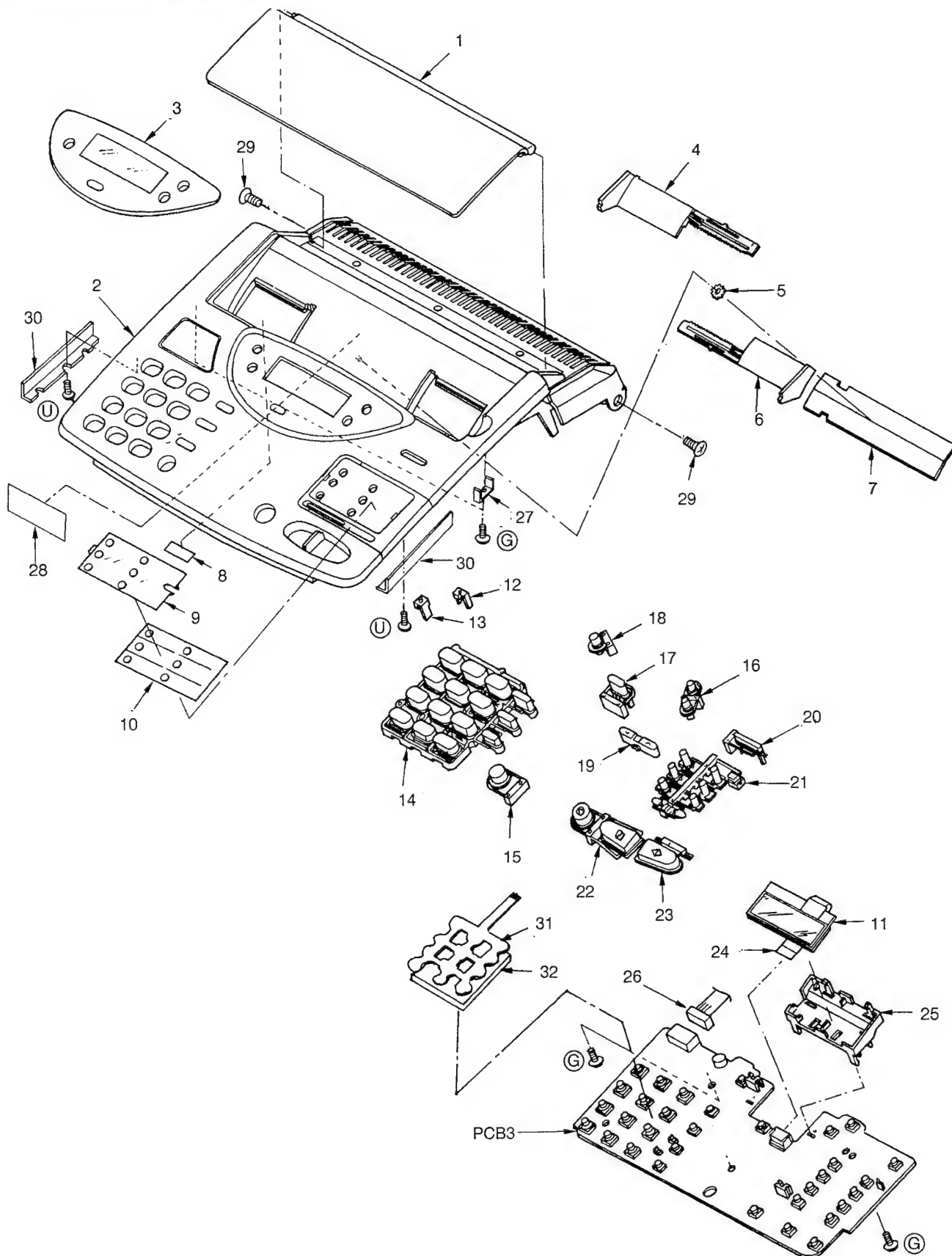


## 6. ACTUAL SIZE SCREWS AND WASHER

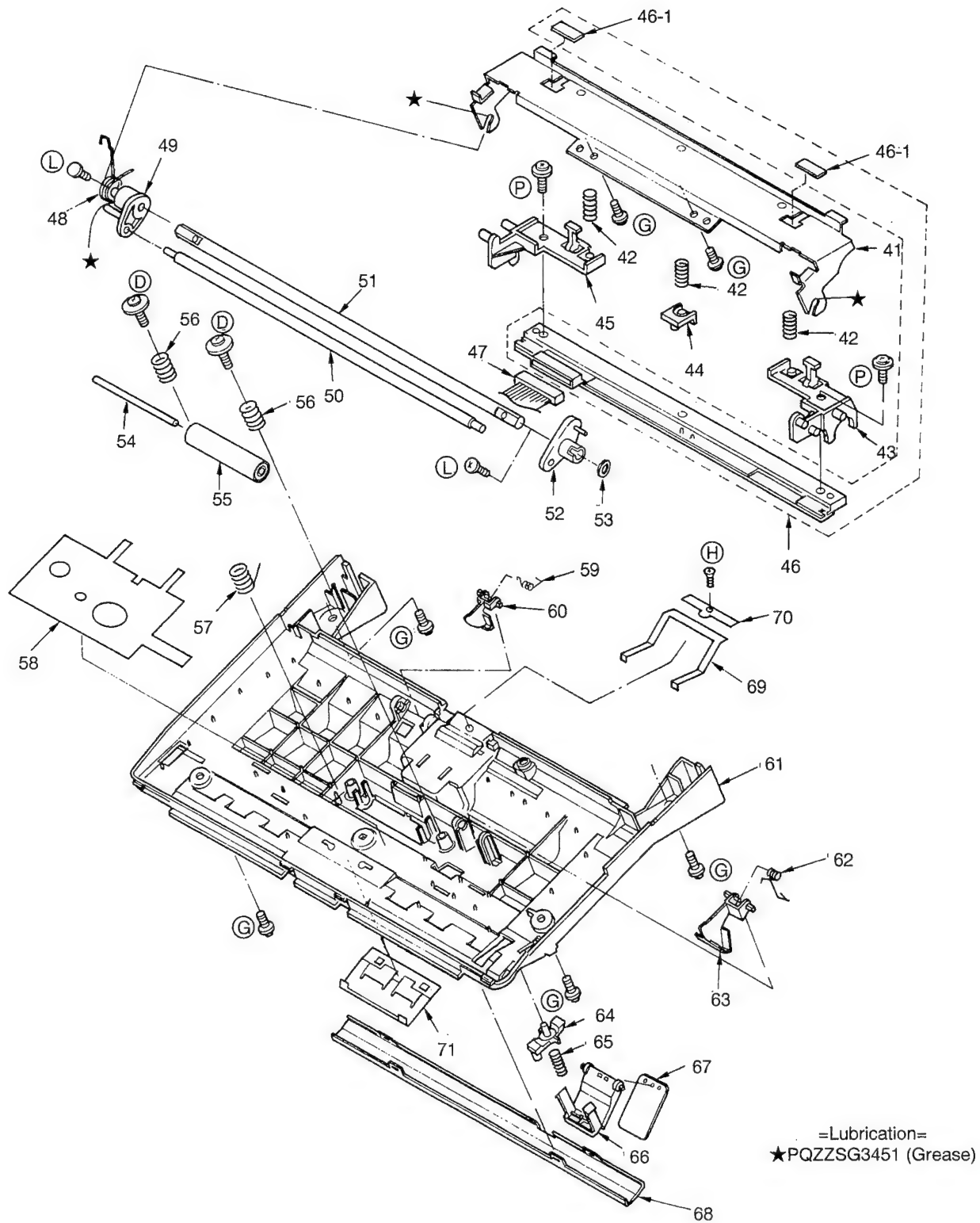
Ref. No.	Part No.	Figure	Ref. No.	Part No.	Figure
Ⓐ	XTT3+5F		Ⓜ	XSB4+6	
Ⓑ	XYC3+CF6		Ⓝ	XWC4B	
Ⓒ	XYN2+C8		⓪	XYN3+CF14	
Ⓓ	XTW3+W10P		Ⓟ	XYC3+FF8C	
Ⓔ	XTW3+S8M		Ⓠ	Not Used	
Ⓕ	XTW3+U6L		Ⓡ	XWG2C6VW	⓪
Ⓖ	XTW3+S10P		Ⓢ	XTW26+5LF	
Ⓗ	XTS26+8G		Ⓣ	PJHE5065Z	
Ⓘ	XTW26+8F		Ⓤ	XTB3+8G	
Ⓙ	XSN3+W6FZ		Ⓥ	XYN3+F16	
Ⓚ	XTW3+S12P				
Ⓛ	XST26+5				

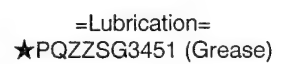
## CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

### 1. OPERATION PANEL SECTION

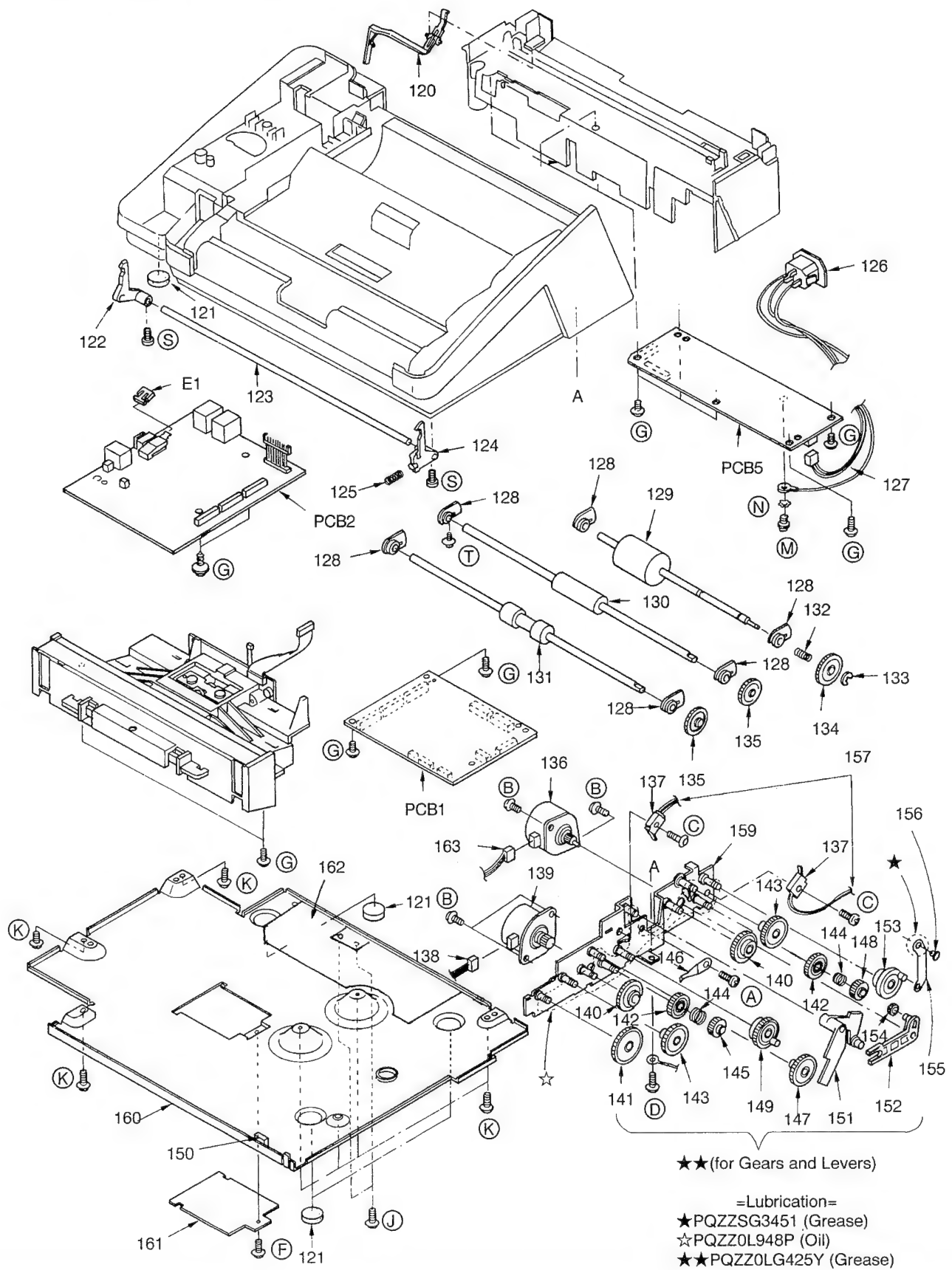


## 2. THERMAL HEAD SECTION

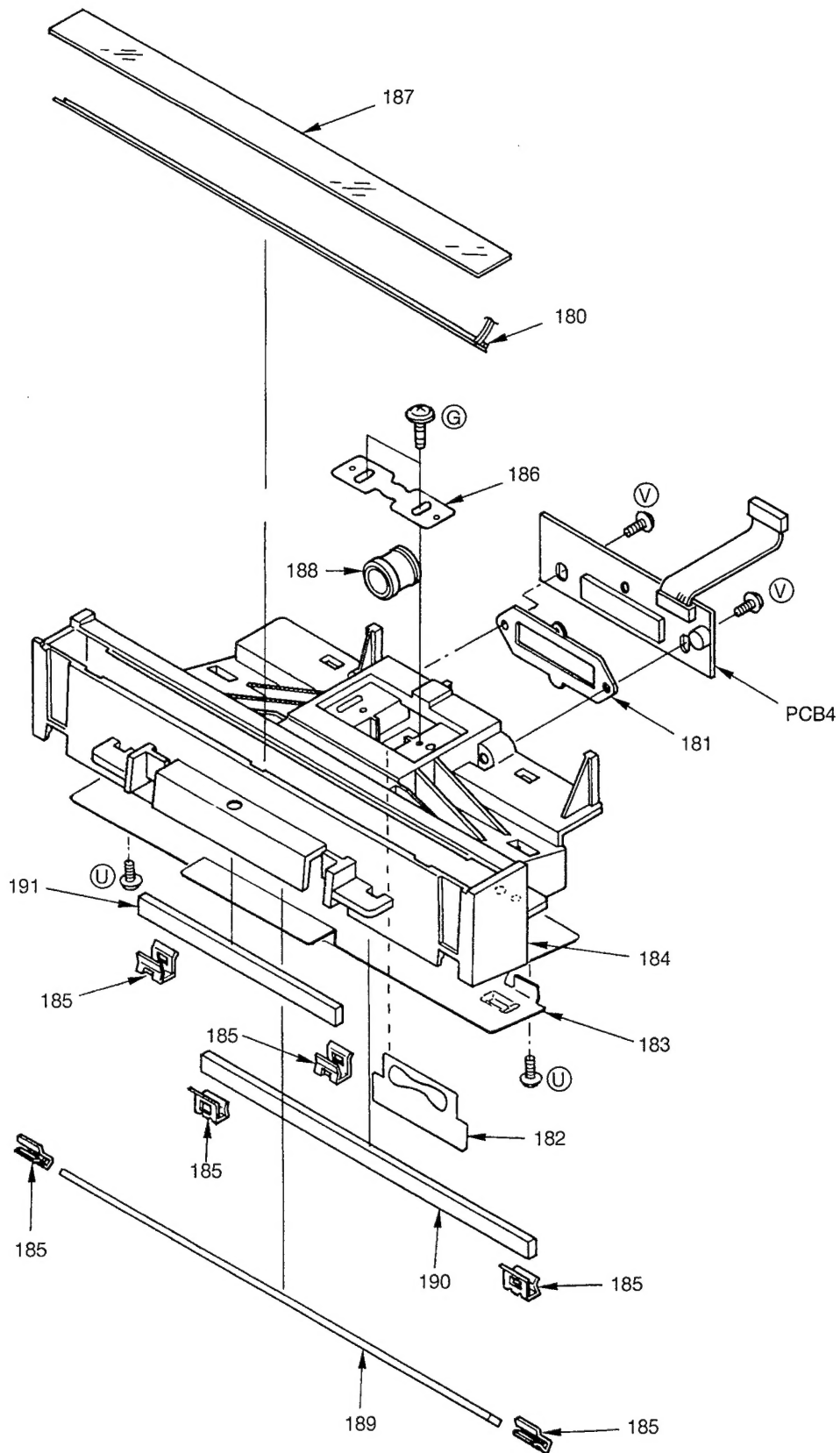





















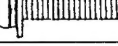
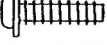

# 4. LOWER BODY SECTION



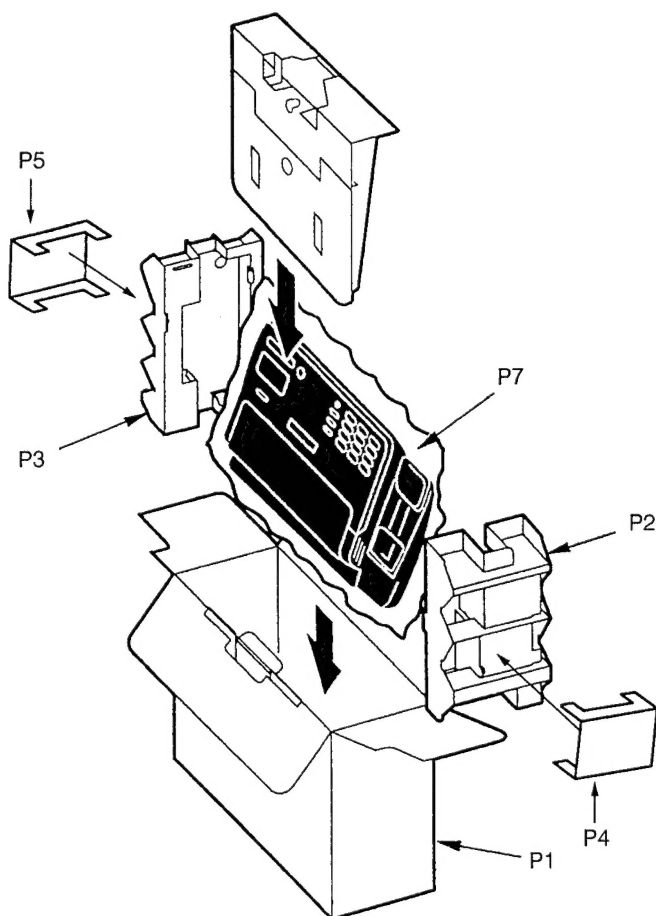
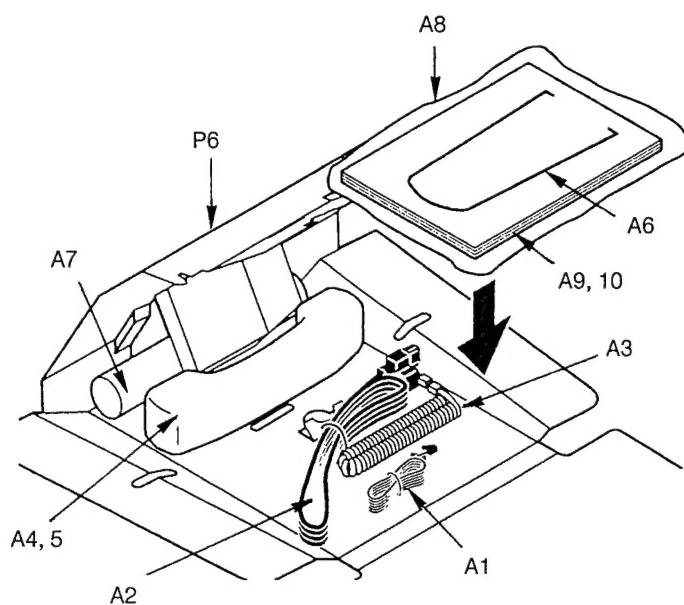
## 5. CCD UNIT SECTION



## 6. ACTUAL SIZE SCREWS AND WASHER

Ref. No.	Part No.	Figure	Ref. No.	Part No.	Figure
Ⓐ	XTT3+5F		Ⓜ	XSB4+6	
Ⓑ	XYC3+CF6		Ⓝ	XWC4B	
Ⓒ	XYN2+C8		⓪	XYN3+CF14	
Ⓓ	XTW3+W10P		Ⓟ	XYC3+FF8C	
Ⓔ	XTW3+S8M		Ⓠ	Not Used	
Ⓕ	XTW3+U6L		Ⓡ	XWG2C6VW	⓪
Ⓖ	XTW3+S10P		Ⓢ	XTW26+5LF	
Ⓗ	XTS26+8G		Ⓣ	PJHE5065Z	
Ⓘ	XTW26+8F		Ⓤ	XTB3+8G	
Ⓙ	XSN3+W6FZ		Ⓥ	XYN3+F16	
Ⓚ	XTW3+S12P				
Ⓛ	XST26+5				

## ACCESSORIES AND PACKING MATERIALS



KX-F2200E-G/KX-F2200E-W